




# *The* Tool Engineer

.....

TOOLING FOR TOYS

PUBLICATION OF THE AMERICAN SOCIETY OF TOOL  ENGINEERS

DECEMBER, 1952

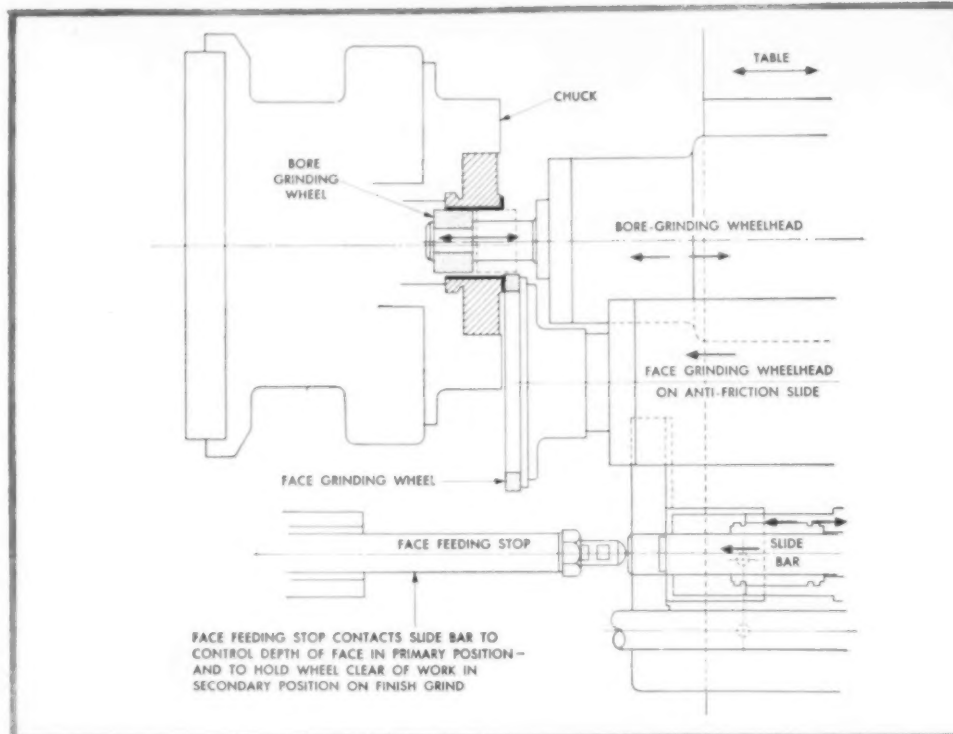
VOLUME XXIX, NO. 6

PLANNING  
ENGINEERING  
CONTROL

OF

TOOLING  
EQUIPMENT  
PRODUCTION

# how to grind a **BORE** and **FACE** at the same time



Simplified schematic diagram of grinding wheel arrangement which permits the bore grinding wheel to reciprocate while the face grinding wheel is held forward against the work.

**Unique sliding-head design on Heald Model 271 Size-Matic permits grinding both surfaces in the time normally required for bore grinding alone**

● This setup permits end facing and bore grinding at a single chucking, producing end faces square with bores.

What's more, it does both jobs without adding to the normal bore



*Heald precision speeds the nation's production*

grinding time — which means a big saving in total time per part. It is best applied on long production runs.

The facing wheel spindle is mounted on anti-friction slide bars, and is driven by a special motor with an extended stator. As the table reciprocates, the facing wheel is held stationary against the work and the driving rotor remains in the magnetic field of the stator, which moves back and forth with the table. An automatic feeding stop controls the face grinding depth, with provision for wheel face-wear compensation.

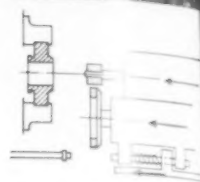
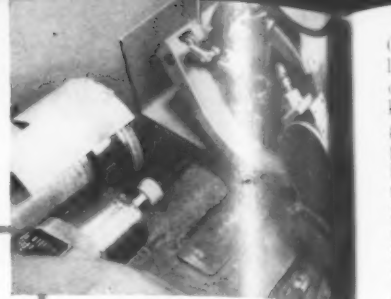
This is another example of how Heald engineering can help to increase your production and improve product quality. Remember — when it comes to precision finishing, it pays to come to Heald.

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATIC

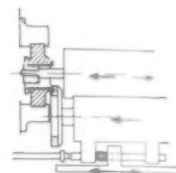
**THE HEALD MACHINE COMPANY**

**WORCESTER 6, MASSACHUSETTS**

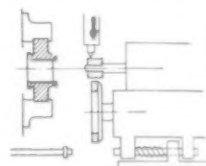
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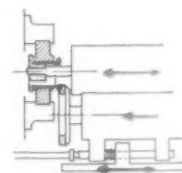
**1. LOAD AND START** Work is held in a diaphragm chuck and located by pitch diameter of the gear teeth. Table is then rapid traversed to grinding position.



**2. SEMI-FINISH GRIND BORE AND FACE** Bore grinding wheel reciprocates with machine table, while facing wheel (mounted on anti-friction slide bars) is held forward against the work under spring pressure. Face feeding stop contacts slide bar to control depth of face grind.



**3. DRESS BORE GRINDING WHEEL** Table runs out to dress position for automatic dressing of the bore grinding wheel.



**4. FINISH GRIND BORE** Dressing wheel reciprocates in bore for finish grind, while facing wheel is held away from work in a secondary position by face feeding stop. In this retracted position, facing wheel may be dressed manually, as required, while the bore is being finish ground.



The Cover: Boyhood's Christmas dream, a toyland with trains that operate like big ones, opens the article beginning on page 63. Superimposed on the realistic miniature is a portrait of the author, Guy Schumacher. In his 30 years of electric train production, he has seen the development of mechanized production for accurate replicas.



# The Tool Engineer

Volume XXIX, No. 6

December, 1952

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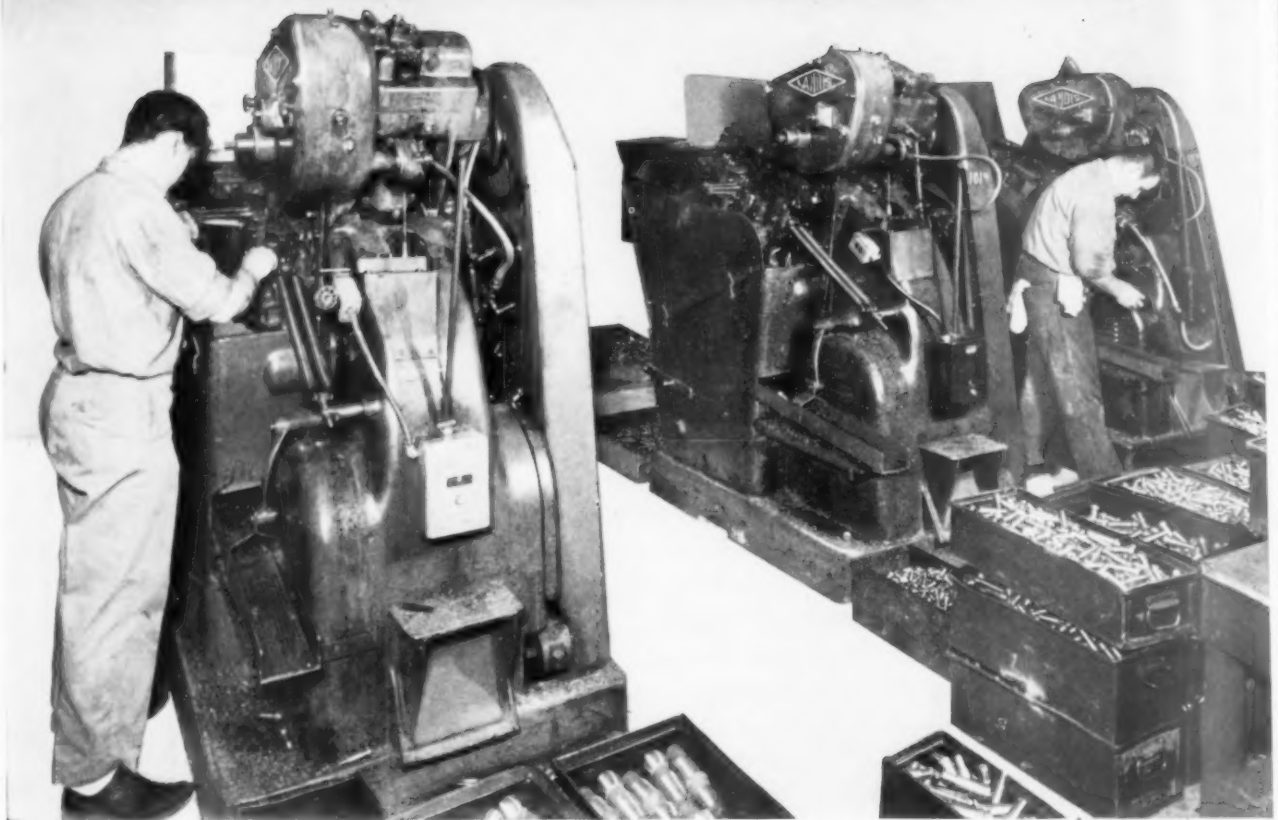
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## AMERICAN SOCIETY OF TOOL ENGINEERS

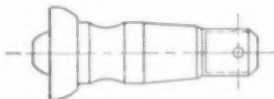
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# LANDIS *Automatic* PROVED BY PRODUCTION . . .



## *Points and Threads 1020 Ball Studs per hour*

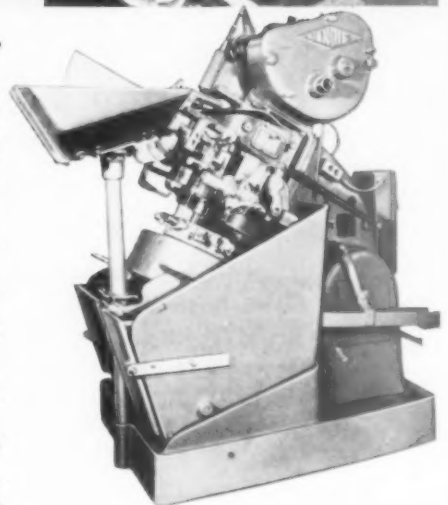
Through the use of LANDIS Automatic Forming and Threading Machines, a large manufacturer has solved his problem of mass-producing certain automotive parts.



The workpieces are cold-forged blanks, from which ball studs are made. Specifications require a 45° point and a 9/16" 18-pitch N.F. thread cut to a length of 5/8". In constant daily operation is a battery of LANDIS Automatic Forming and Threading Machines, each of which point and thread 1020 pieces per hour. Four hours of production are obtained between each chaser grinding, resulting in low tool cost and minimum machine down time.

Because of their universal features, LANDIS Automatic Forming and Threading Machines are adaptable to mass-production operations on a wide range of automotive parts. By means of pick-off speed change gears, the machine cycle can be varied to accommodate any combination of thread length, pitch, and thread diameter, within the capacity of the machine—therefore this machine is adaptable to a wide variety of work. Hopper feed and automatic operation throughout enable one operator to keep a battery of machines in constant production, while set-up changes of all types can be made in minimum time.

Can you revolutionize your pointing and threading operations with LANDIS Automatic Forming and Threading Machines? Please give specifications when writing for complete information.



# LANDIS *Machine* COMPANY • WAYNESBORO PENNSYLVANIA

***'Indispensable for Tool Rooms  
and for Production Departments  
when  
Extreme Accuracy is required''***

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**LATHES • MILLING MACHINES • CHUCKING MACHINES • SECOND OPERATING MACHINES**

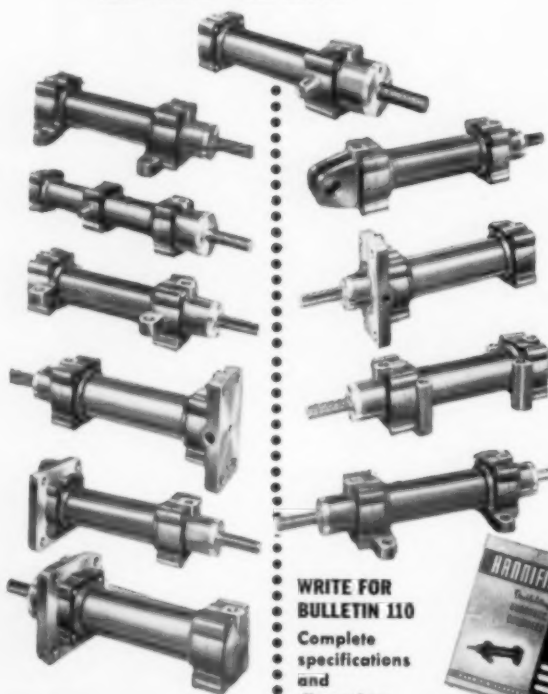


# why HANNIFIN series "N" cylinders are the recognized standard of the hydraulic industry

## THE MOST COMPLETE STANDARD LINE

Hannifin is your single source for the broadest standard line of hydraulic cylinders on the market. When you need hydraulic cylinders, you'll save time and money by selecting from the complete Hannifin line.

- 12 bore sizes, 1" to 8"
- 11 standard mountings—more than 65 combination mountings
- No tie rods; ideal for long-stroke applications
- Cushioned and non-cushioned
- Double end piston rods available in most styles
- Bodies of heavy-walled steel tubing "TRU-BORED" and honed



WRITE FOR  
BULLETIN 110  
Complete  
specifications  
and  
dimensions



## DESIGNED AND BUILT FOR SUPERIOR PERFORMANCE LONGER LIFE

No tie rods. Finer appearance, greater strength. This permits unusual length when required.

Alloy iron Universal end caps. Rugged. Port completely rotatable—air vents four sides.

Alloy iron Universal collars. Removable, replaceable. Permit exact positioning of foot-type mountings.

Satin-smooth bore. "TRU-BORED" perfectly straight, perfectly round.

Cast iron piston. Grooves precision cut for superior seal. Piston concentric with and locked to piston rod.

Confined gaskets—seal positively, cannot extrude.

Ground steel piston rod. Concentric with and locked to piston.

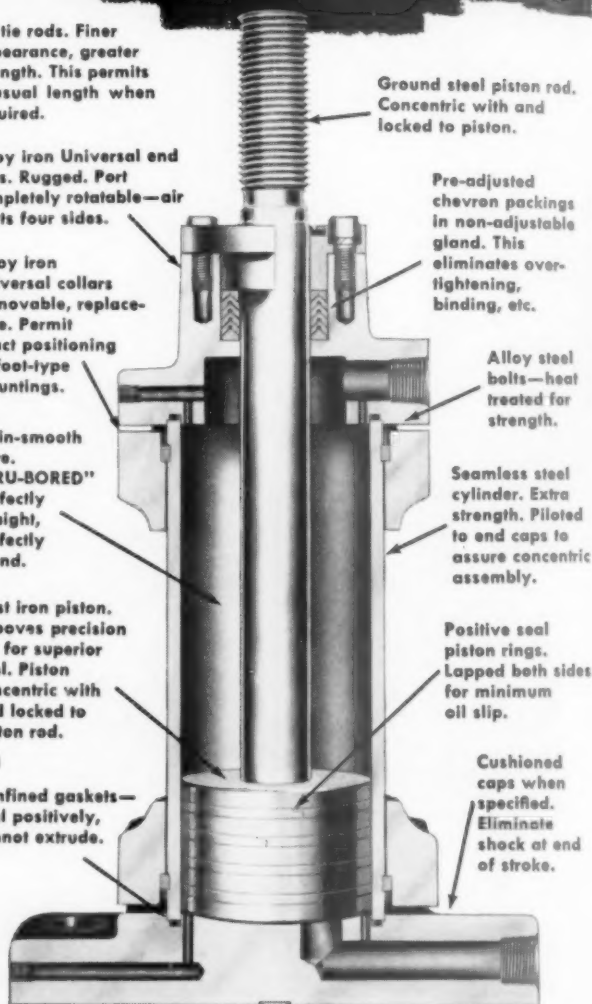
Pre-adjusted chevron packings in non-adjustable gland. This eliminates over-tightening, binding, etc.

Alloy steel bolts—heat treated for strength.

Seamless steel cylinder. Extra strength. Piloted to end caps to assure concentric assembly.

Positive seal piston rings. Lapped both sides for minimum oil slip.

Cushioned caps when specified. Eliminate shock at end of stroke.



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**STANDARD**

# DIAL BORE GAGES

*for Positive, Direct, Precision Measurement*

No. 6

6" to 12 $\frac{1}{8}$ "\*

No. 5

3 $\frac{3}{32}$ " to 6 $\frac{1}{8}$ "

No. 4

2 $\frac{1}{8}$ " to 3 $\frac{1}{8}$ "

No. 3

1 $\frac{1}{2}$ " to 2 $\frac{5}{32}$ "

No. 2

1" to 1 $\frac{17}{32}$ "

No. 1

$\frac{5}{8}$ " to 1"

No. 0

$\frac{3}{8}$ " to  $\frac{5}{8}$ "

No. 00

$\frac{1}{4}$ " to  $\frac{3}{8}$ "\*\*

\*Range of No. 6 Gage can be extended to 16" with special extensions.

**8 SIZES**  
for all bores from  
 $\frac{1}{4}$ " to 16"

Extensions furnished to give complete range shown for each size (except No. 00).

Repeat consistently. Two centralizing plungers on sizes 0 through 6 keep line of measurement through center of bore at all times. Eliminates questionable decisions; minimizes unnecessary rejects; saves time and money.



**VERTICAL TYPE**



**VERTICAL 90° TYPE**



**PISTOL GRIP TYPE**

In addition to above, special gages available for out-of-ordinary applications.

**STANDARD** Dial Bore Gages are now available in eight sizes. As a group they cover a range from  $\frac{1}{4}$ " to 16".

They bring high precision right to the workpiece . . . in the machine or at the bench . . . and without auxiliary apparatus.

## NEW!

The No. 00 Gage with Centering-size Discs for checking bores  $\frac{1}{4}$ " to  $\frac{3}{8}$ " with tolerances up to .005"

\*\*Regularly supplied with a centering-size disc made for dimension specified by user. Discs of other sizes may be readily interchanged. If set of discs is desired, covering complete range of  $\frac{1}{4}$ " to  $\frac{3}{8}$ ", write for information.

Patent Applied For

WRITE FOR DETAILED INFORMATION

**STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.**

# General AND Special Purpose TAPS

WINTER offers two series of taps: general purpose, and taps for special applications. Both are standard items, stocked at factory branches and by most dealers.

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Distributors in principal cities. Branches in New York, Detroit, Chicago, San Francisco. Division of National Twist Drill & Tool Co.

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• YOUR SERVICE



• Your local Industrial Supply Dis-  
• tributor carries a complete stock  
• of WINTER Taps.



# WINTER





# National



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Rochester, Mich., U. S. A. Distributors in principal cities. Factory Branches: New York • Chicago • Cleveland • Detroit • San Francisco



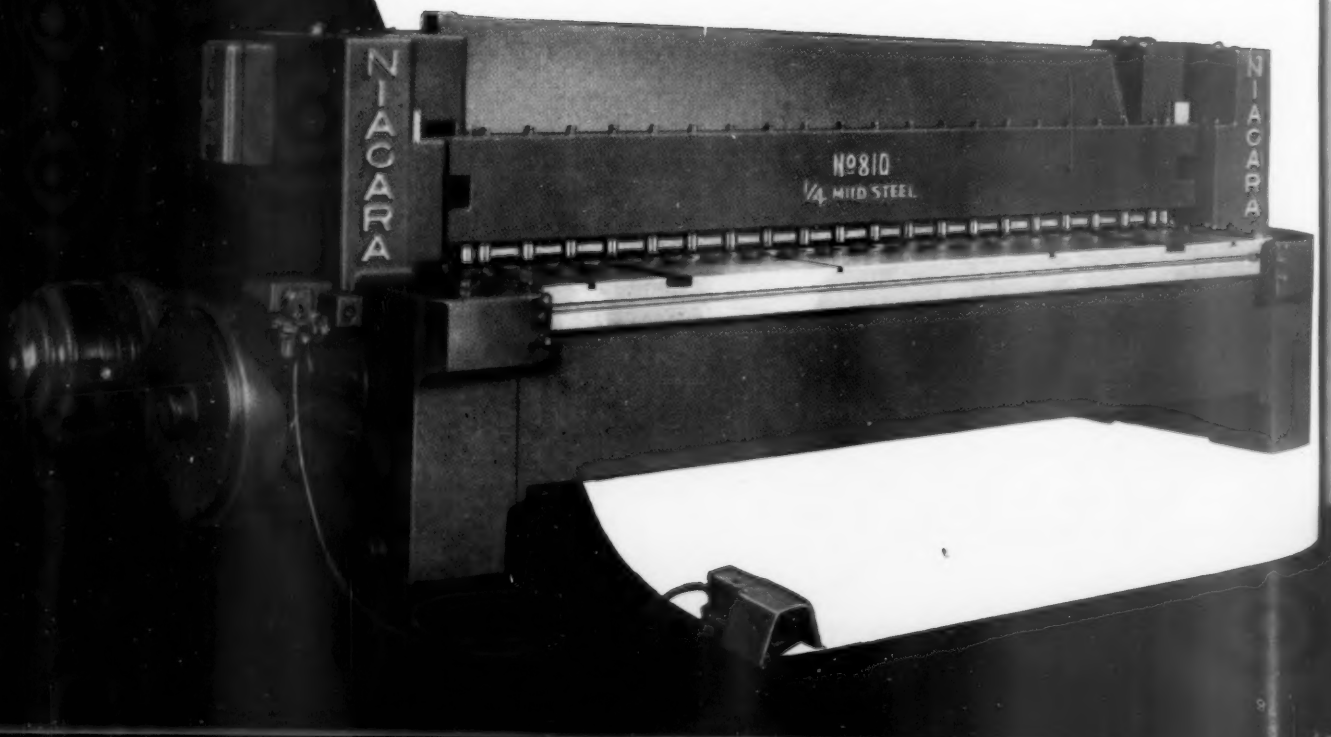
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at General Sheet Steel Co., Detroit, Mich.



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## POWER SQUARING SHEARS

after shearing  
thousands of tons  
of steel  
of all kinds

### LET'S LOOK AT THE RECORD!

#### NIAGARA

Shears are designed for  
HIGH VOLUME SHEARING  
ACCURACY  
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LOW MAINTENANCE  
COSTS

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#### SERVICE RECORD

6

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*Total Cost of  
Repairs*

*less than \$20 per shear  
per year*

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Manufacturers of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

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# PRATT & WHITNEY "KELLERING"

*Key to* PRECISION  
MOLDS and DIES  
FOR BETTER  
PRODUCTS

*Unequalled for*  
SPEED, ACCURACY,  
ECONOMY

PHOTO COURTESY OF INTERNATIONAL MOLDED PLASTICS INC., CLEVELAND.

Pratt & Whitney-KELLER Machines are tracer-controlled millers that faithfully duplicate the shape of any master form or pattern. Very complicated shapes are duplicated as easily and accurately as simple work. Molds and dies of every type can be machined much faster than by any other method, and very little hand finishing is required.

The complete P&W-KELLER line includes models to accommodate a very wide range of work sizes. The Type BL — shown above machining the mold for the platter in this quality plastic dinnerware set — is a versatile machine specifically designed to handle a wide variety of small and medium sized jobs economically and efficiently.

Learn how a Pratt & Whitney-KELLER Machine can lower your die and mold costs and increase your profits. Send today for your copy of P&W Circular No. 490-2. Write on your Company letterhead to the Pratt & Whitney Branch Office nearest you or direct to West Hartford.

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Vertical Shapers  
Toolroom Lathes and Accessories  
Keller (Tracer-controlled) Machines  
Kellerflex Flexible Shaft Machines and Accessories  
Kellerflex H. S. Steel and Carbide Burs  
Automatic Duplicating Machines for Forging Dies  
Automatic Duplicating Machines for Bottle Molds  
Cutter and Radius Grinders  
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### CUTTING TOOLS

Taps and Dies (all types)  
Milling Cutters (all types)  
Reamers (all types)  
Drills and Counterbores

### GAGES

Precision Gage Blocks (Steel and Carbide)  
Supermicrometers  
Electrolimit Comparators  
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MACHINE TOOLS • CUTTING TOOLS • GAGES

# OSBORN



**THE SET-UP.** This shows the centerless grinding machine which also serves as a "centerless brusher". These pump rods vary from 1 1/4 in. to 1 1/2 in. diameter . . . from 6 ft. to 36 ft. in length. Regulating wheel speed is 52 r.p.m.



**ANOTHER JOB.** Here Centerless Brushing finishes cast iron pistons to micro-smoothness. Simplifies assembly operations and increases life of pistons and cylinders. Output of this machine is 10,000 pieces per 8 hours.

## Finer finish . . . longer product life with Centerless Brushing

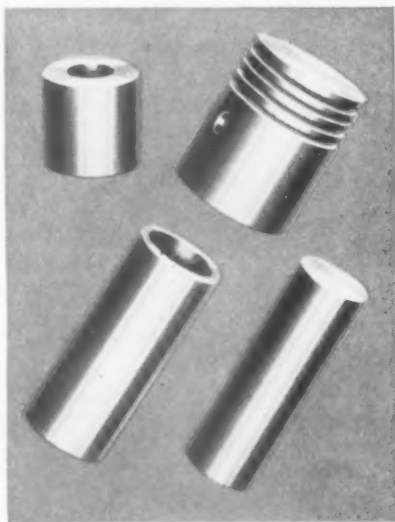
*This machine* does double duty. For removal of metal to close tolerance, it is a *centerless grinder*. Then, for finishing the surface to micro-smoothness it is a *centerless brusher*. Its conversion takes only a few minutes.

In the operation shown above, nickel-moly steel rods for pumps, are being finished by an Osborn Fascut Brush. Prior to brushing, the same machine with a grinding wheel in place of the brush made a rough grind, taking off .006 inch, and a finish grind, taking off .002 inch. Results of the Centerless Brushing: Produces a smoother finish. Reduces wear in pump packing. Reduces corrosive action on rods; makes them last longer.

An Osborn Brushing Analyst helped develop this improvement. Ask your **OBA** to help you on all problems of cleaning and finishing! Call him today or write *The Osborn Manufacturing Company, Dept. 893, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

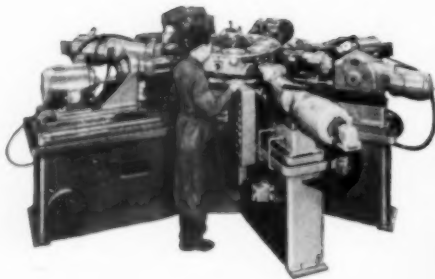
# Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



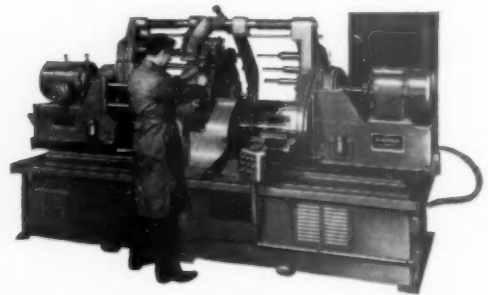
**TYPICAL PARTS** which are being improved by Centerless Brushing include pistons, piston pins, bushings, tubing . . . any cylindrical parts. It can be applied to many sizes of parts and types of material on a mass production basis.

# closeups of drilling & tapping **PRODUCTION**



The Hartford Special machine above is drilling, tapping and chamfering side pad holes in compressor rear frames.

The machine at the left, using a vertical dial, is core drilling, rough and finish reaming, rough and finish facing and chamfering two rockers simultaneously.



**When it comes to production**

**SUPER-  
SPACERS**



**Automatic  
THREAD  
ROLLERS**



**HARTFORD**  
*Special*

**THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.**

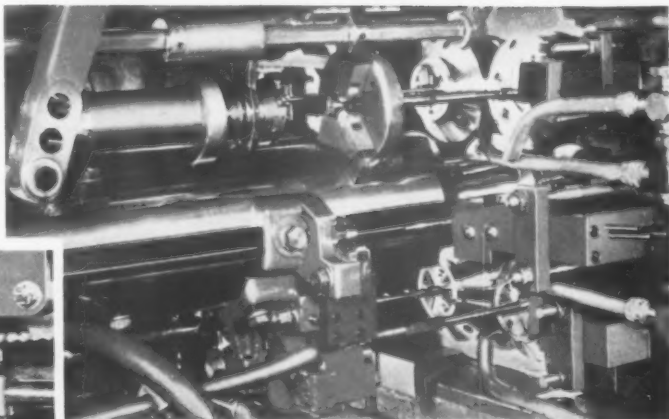


Although certain types of shaft jobs offer natural opportunity as bar machine work, with the exception of the CONOMATIC, seldom do they appear on multiple spindle bar automatics. In general, shaft jobs require a longer tooling area than do other types of bar work.

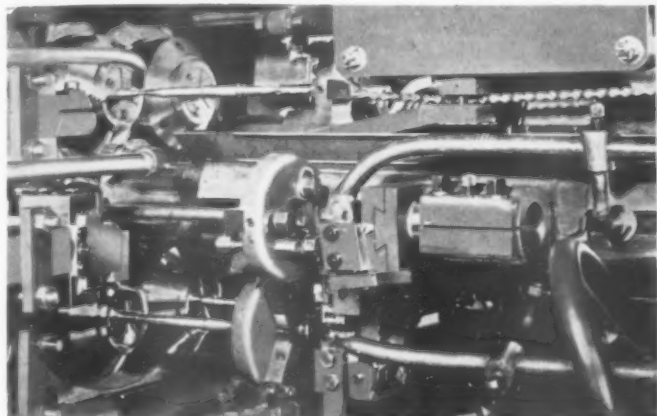
A glance at the frame design of the CONOMATIC explains why its tooling area is longer\* than the tooling areas of other "automatics." And there are more tool positions\* and more room\* for tool setting for any type of job.

\*You can have the figures

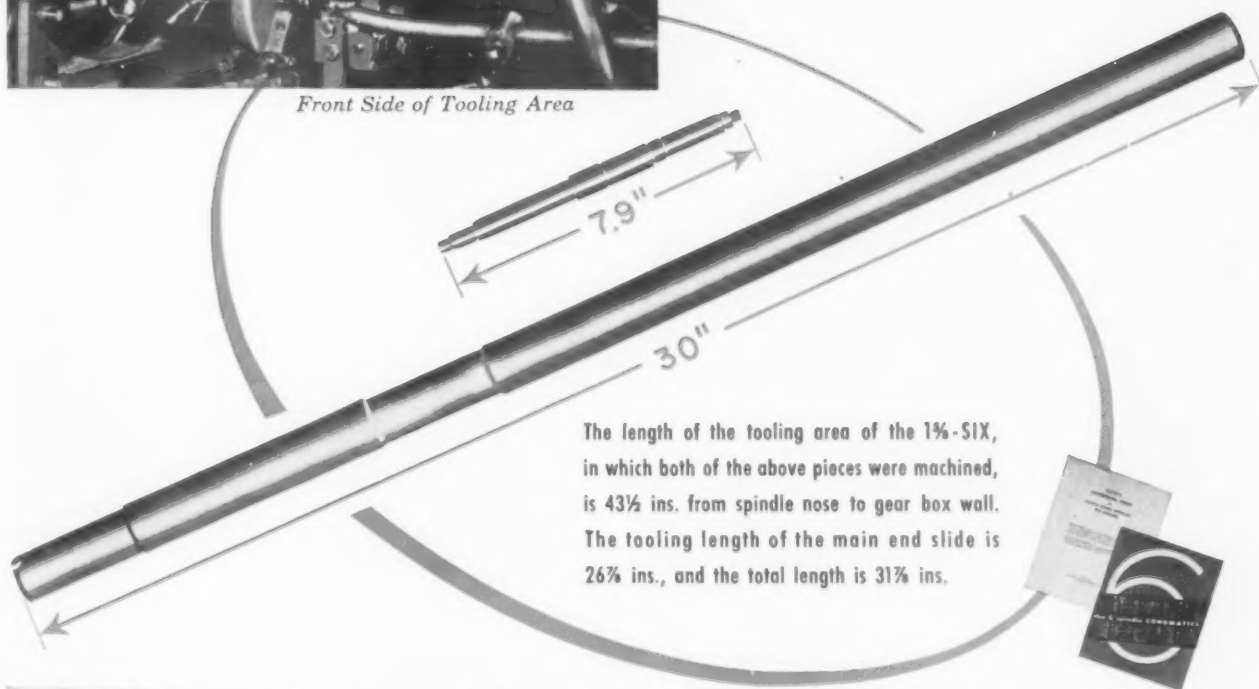
## THERE'S *More* THAN JUST "Elbow Room"



Rear Side of Tooling Area



Front Side of Tooling Area



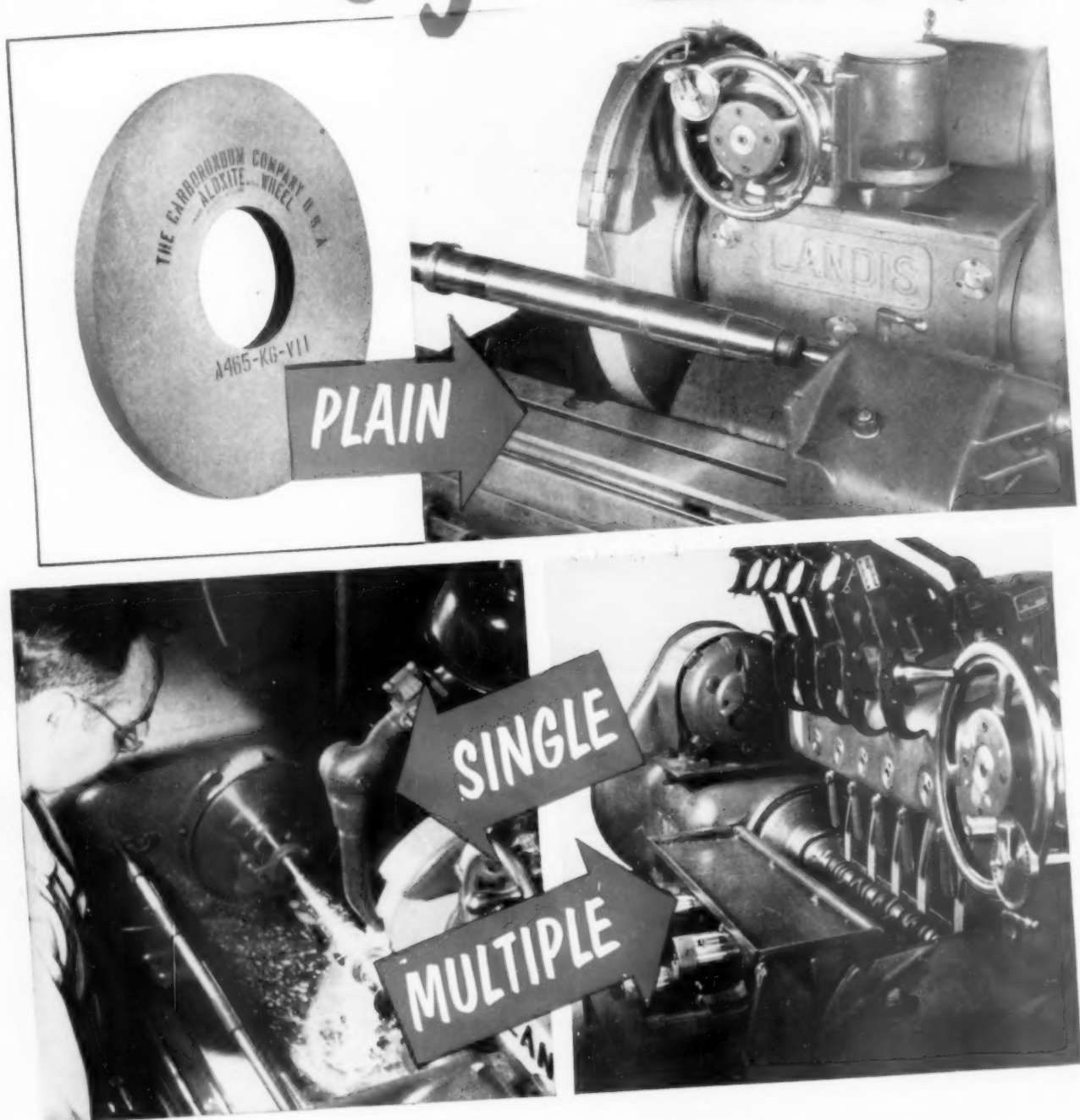
*A Comparison of ALL Automatics is in favor of Cone*



# Conomatic

CONE AUTOMATIC  
MACHINE COMPANY, INC.  
WINDSOR, VT., U.S.A.

# Cylindrical



Only **CARBO** TRADE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York.

# Grinding



Cylindrical Grinding Wheels by CARBORUNDUM give you the right combination of aluminum oxide grain and vitrified bond—the combination that, on *your* specific job, spells highest output at lowest cost.

## ABRASIVE GRADES

**ALOXITE "A"**—a more friable type of regular aluminum oxide grain for roughing and finishing on soft to medium hard stock.

**ALOXITE "AA"**—chemically pure type of aluminum oxide grain, extremely friable and thus ideal for grinding heat-sensitive, hard alloy steels.

**ALOXITE "DA"**—blend of "A" and "AA" grain types. Cuts cool and fast on the harder heat treated steels.

## VITRIFIED BONDS

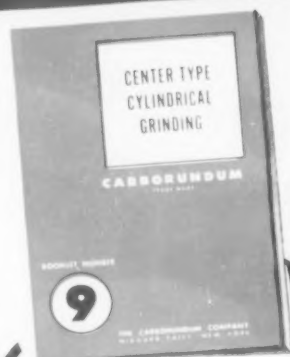
**"V10"**—cool cutting, yet tough...the standard structure is superior on form grinding work and wherever finish is more important than stock removal.

**"V11"**—for moderate to heavy stock removal. Very cool cutting, with a more open structure that promotes high cutting rates. Holds corners well. Widely preferred on crankshaft work.

**"V12"**—a very open structure uniquely successful on large crankshafts. Generates a precision finish, free from burns, on difficult work involving large areas of contact, high sidewalls and large pin diameters.

And for cylindrical grinding of low tensile materials, CARBORUNDUM silicon carbide wheels, in two types of abrasive grain and two types of vitrified bond, deliver the same high-output, low-cost production on cast iron, aluminum, brass, etc.

**ORDER FROM YOUR CARBORUNDUM DISTRIBUTOR TODAY.** He's your best bet for complete stocks, prompt delivery, experienced counsel on latest developments in the field. You'll find him listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!



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offers **ALL** abrasive products...to give you the proper **ONE**

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HYDRAULIC METALWORKING EQUIPMENT

*is faster!*

*... for Piercing*

*for Punch Extruding...*

*... for Trimming*

*for Riveting...*

You can pierce, trim, extrude or rivet at less cost because you can do it faster with Danly Hydraulic Metalworking Equipment!

Check these new cost and time saving advantages:

- **Greater Capacity** . . . the exclusive Danly hydraulic system minimizes break-through shock and permits smoother operation at higher pressures. You can pierce holes smaller in diameter than the thickness of your steel!

- **Automatic Stripping Action** . . . set-up and operation are greatly simplified because blank-holding and stripping action is an integral part of the Danly power cylinder cycle . . . completely hydraulic.

- **Less Down Time** . . . hardened and ground wear surfaces and extra long guides assure maximum tool life. Springs and rubber cushions, a major cause of failure, are eliminated.

**DANLY MACHINE SPECIALTIES, INC.**

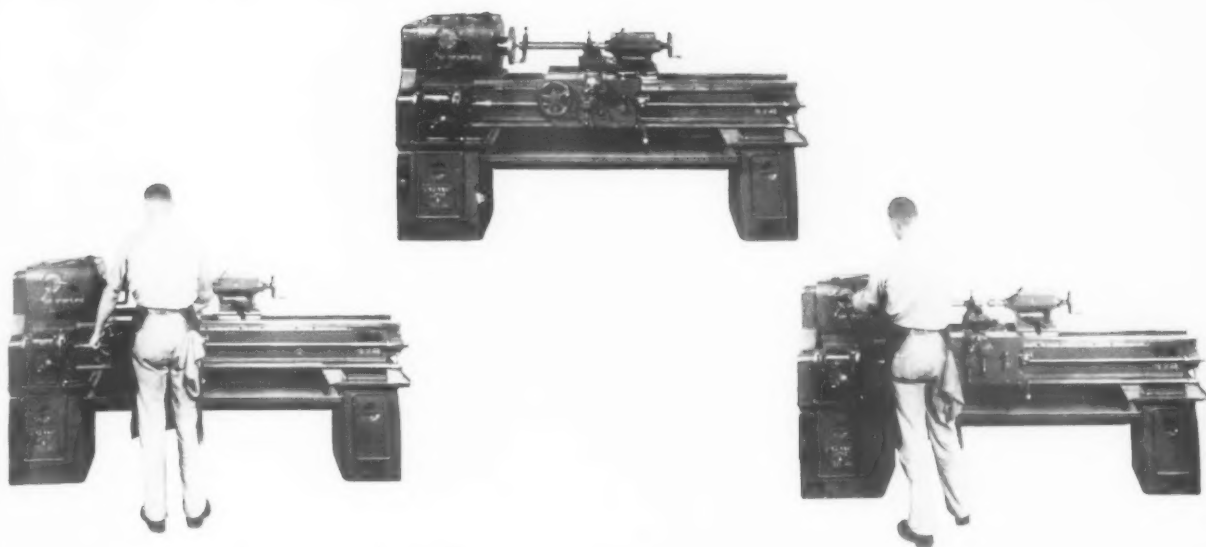
2100 South Laramie Avenue • Chicago 50, Illinois



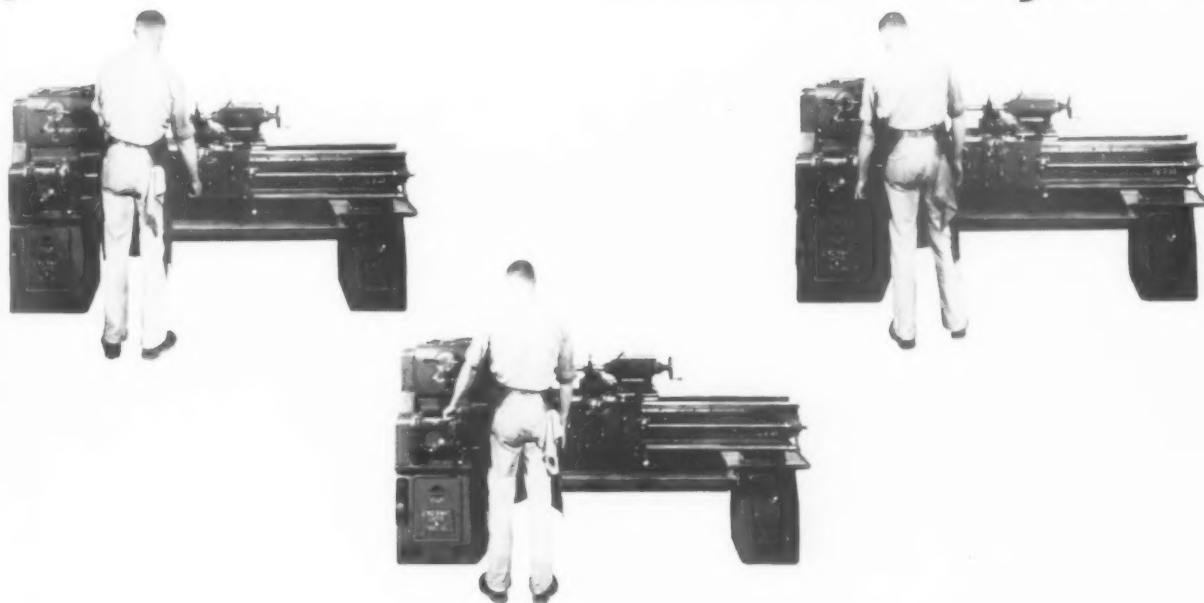
HYDRAULIC METALWORKING EQUIPMENT  
MECHANICAL PRESSES... 50 TO 3000 TONS

*Application possibilities are almost unlimited because Danly Hydraulic Metalworking Equipment is engineered to meet your specific needs. Write today for complete information.*





*up to the minute: over the years*

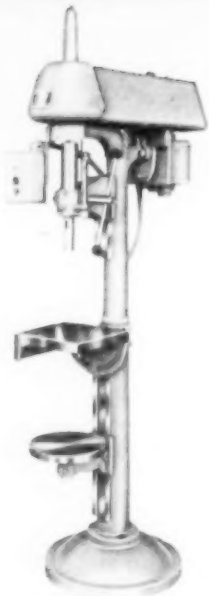


Cincinnati Tray-Tops offer the only complete line of **modern design**, light-duty, all geared head engine lathes that combine real economy prices with "high-priced" lathe features: 12 spindle speeds in geometric progression with an all-geared transmission—direct reading, three lever, color-match speed selector—spindle mounted in 3 precision bearings—totally enclosed quick change gear box—flame hardened transmission gears—ground bedways (flame hardened at small extra cost)—and many other **top quality** construction details.

The unique "Tray-Top" parking spaces (for tools, etc.) typify the time and motion-saving conveniences that pay off in better work and more of it...

Engine, toolroom, and gap models. Swing sizes: 10", 12½", 15", and 18". Write for Catalog T-108.

**Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio**



14" 3000 SLIDING HEAD FLOOR DRILL

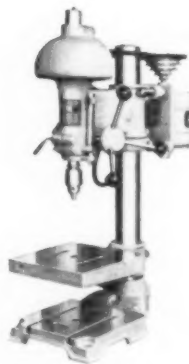


16" 3000 SLIDING HEAD FLOOR DRILL

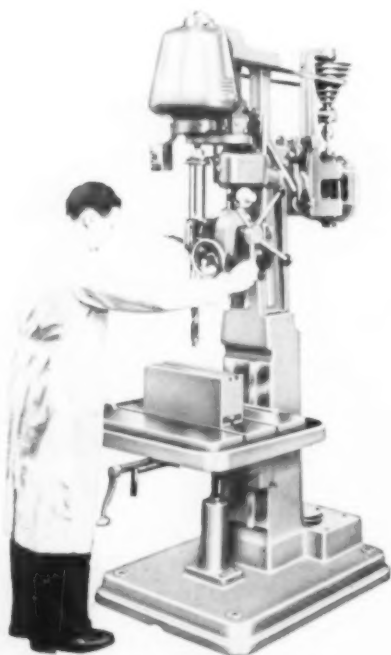
If the bulk of your drilling operations calls for 1½" OD or less, check with your nearby Cincinnati dealer before you buy any equipment. The complete line he'll display ranges from 16 Royal bench drills through 3' arm 7" column radial machines. See for yourself the sturdy construc-



*a complete line:*



16" ROYAL BENCH DRILL

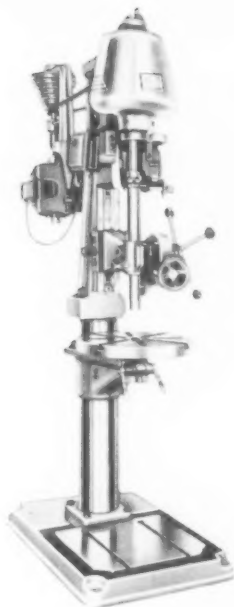


21" SLIDING HEAD BOX COLUMN FLOOR DRILL

Your operators will appreciate the unique Cincinnati tilting motor bracket which makes belt shifting quick and easy without wrenches or squeezed fingers. It's standard on all V-belt driven models. Best buy for fixture work is the Cincinnati 3' arm 7" column radial designed to fill the gap between large radials and upright equipment. Shops all over the coun-

CANEDY-OTTO DIVISION  
Cincinnati Lathe & Tool Co.

tion that puts "Cincinnati" second to none in accuracy, dependability and convenience. Discover how, by omitting frills and by using advanced manufacturing techniques in one of this country's most modern plants, we can provide you with quality machines promptly, at economy prices.



21" SLIDING HEAD ROUND COLUMN FLOOR DRILL



18" ROYAL FLOOR DRILL

## *Cincinnati drilling machines*



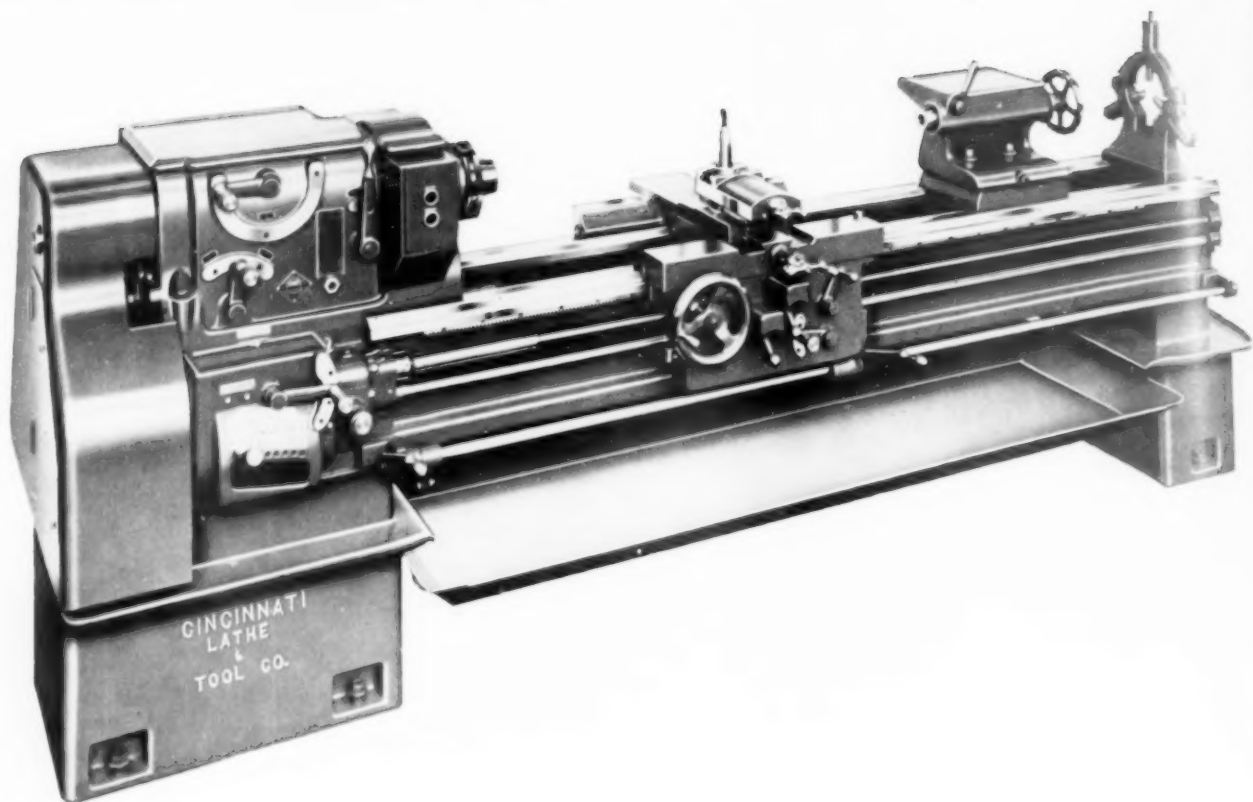
18" ROYAL BENCH DRILL

try tell us this machine breaks bottlenecks by freeing big radials for large work, conserves floor space, handles easily, and produces a high return on a relatively low investment. For 90% of your drilling requirements you'll be right On Center with "Cincinnati." Bench, floor, and multi-spindle models available. Write for the name of your nearest dealer.

Cincinnati 9, Ohio, U. S. A.



3' ARM, 7" COLUMN RADIAL DRILL



## *cincinnati model LT lathes*

For a minimum investment, the new Cincinnati Model LT medium-duty engine and gap lathes give you **round-the-clock** dependability, handling the vast bulk of lathe work in maintenance and repair shops, general machine shops, and manufacturing plants. Their straightforward, simple design, ease of operation, and precision construction, make them a first consideration on any medium-duty lathe purchase. Write for Catalog S-102.

### *modern machine designs by staff engineers*

Cincinnati Lathe & Tool Co. maintains a continuing product design and development program, with complete engineering facilities, to provide constant improvements in machine performance. That's why Cincinnati Lathes and Drills will always be **up-to-the-minute**—over the years.



**Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio, U.S.A.**

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# Newly Created Machine Tool WITH 3 DELTA DRILL UNITS

## Solves Jet Engine Production Problem

- Machine is "universally tooled"—quickly adjustable to unlimited variety of drilling patterns....change-over in a few minutes.
- Drills, reams, countersinks at one set-up.
- Drills easily checked for sharpness, changed quickly.

When no conventional machine was sufficiently flexible for handling a wide variety of drilling patterns in axial-flow gas turbine engine production, Pratt & Whitney Aircraft engineers designed one—using three Delta Air Powered Hydraulic Drill Units.

These three drill heads, operating as a single machine tool, produced immediate benefits. Elimination of special jigs made it possible to have absolutely accurate dimensions in each part produced—thus insuring interchangeability of the close tolerance component parts. In addition, definite production economies were effected by elimination of costly jigs and fixtures.

Every application of the Delta Air-Powered Hydraulic Drill Unit has resulted in substantial direct savings—faster production, easier tool changes, lower costs.

*There's a Delta Tool for Your Job—*

WOOD OR METAL WORKING

53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

Another  Product

Here is another of many instances of alert production engineers finding quick solution of knotty machining problems, through application of the Delta Air Powered Hydraulic Drill Unit. Others are described in the Delta Drill Unit Catalog — containing complete specifications and guidance in selecting the right size for your needs.

**DELTA**  
**MILWAUKEE**

DELTA POWER TOOL DIVISION

**Rockwell**

MANUFACTURING COMPANY

620P North Lexington Avenue • Pittsburgh 8, Pa.

☐ Please send me a new Drill Unit Catalog

☐ Please send me address of nearest Delta Drill Unit Representative

Name

Position

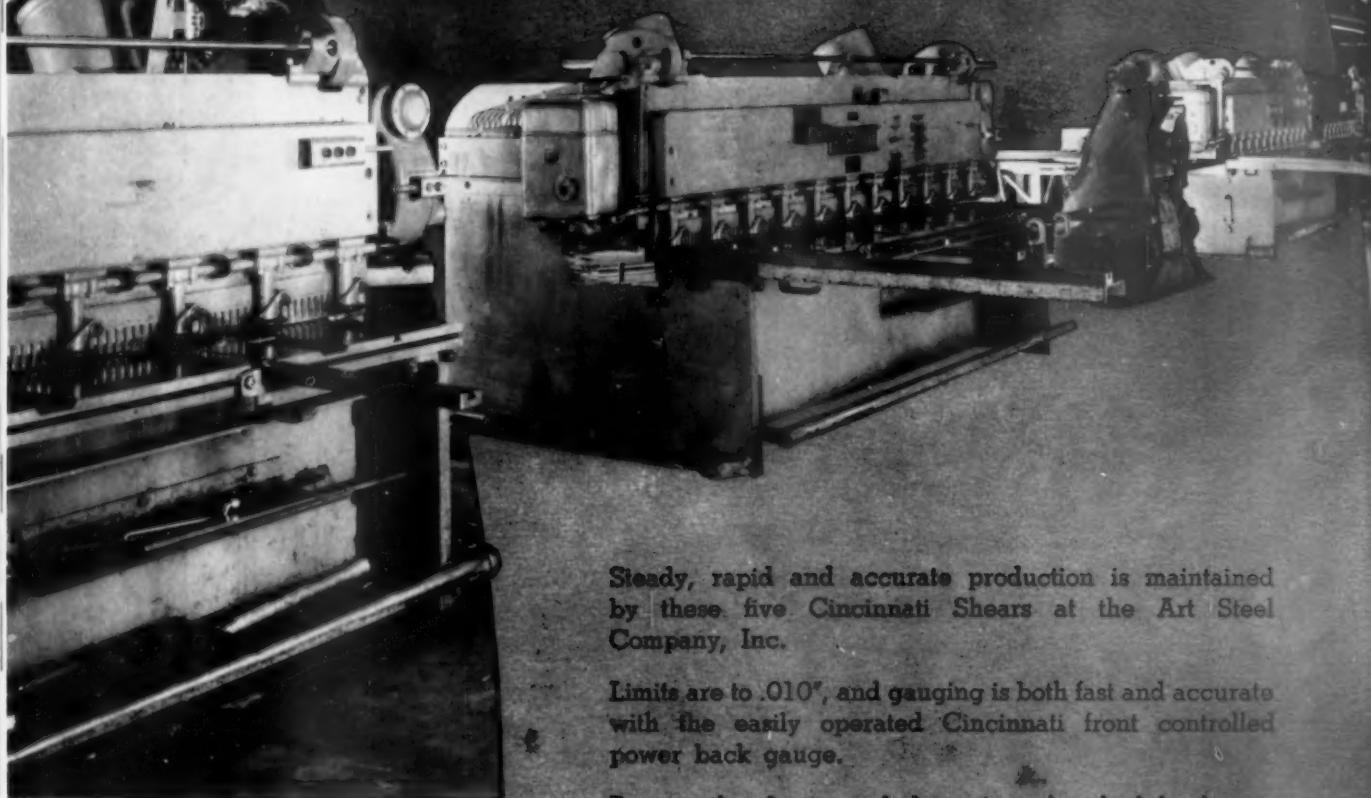
Company

Address

City  Zone  State

# 20,000,000 lbs. of steel

**TAKES DEPENDABLE PERFORMANCE**



*Photos—  
Courtesy the Art Steel Co., Inc.,  
New York, N. Y.*

Steady, rapid and accurate production is maintained by these five Cincinnati Shears at the Art Steel Company, Inc.

Limits are to .010", and gauging is both fast and accurate with the easily operated Cincinnati front controlled power back gauge.

Despite the day-in and day-out work schedule, knives are sharpened but once a year.

Investigate these accurate, dependable Cincinnati Shears—you will find them profitable in your shop. Remember, straight-edged square blanks, accurate to size, are produced at low cost on these modern Cincinnati Shears.

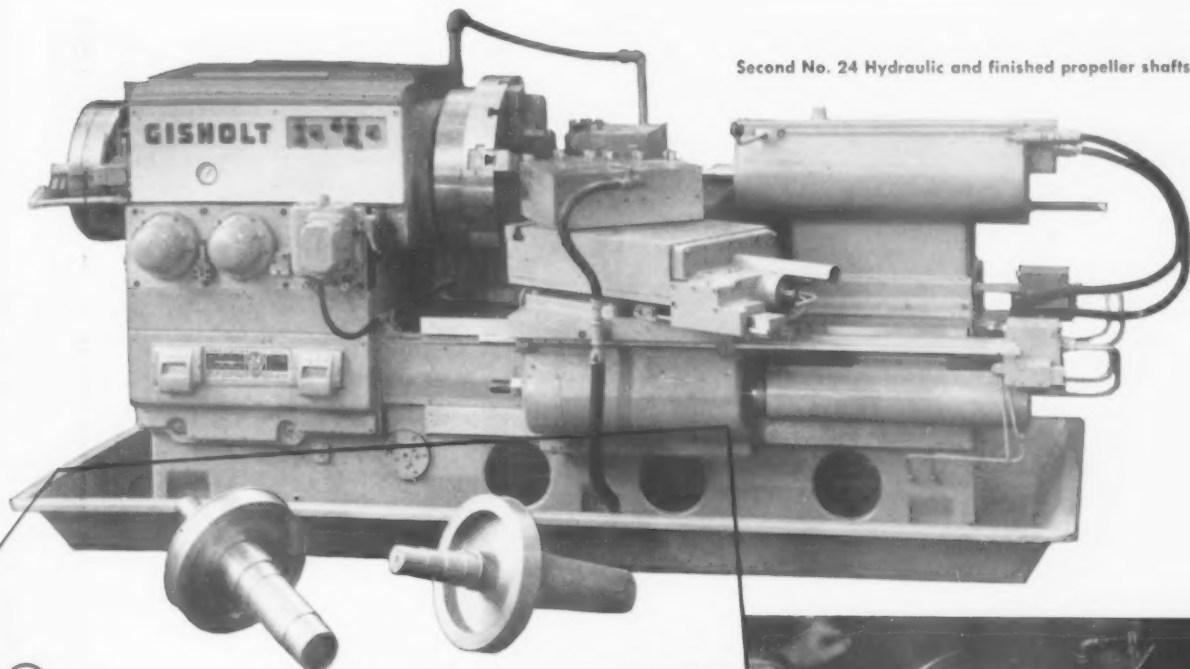
Write for Shear Catalog S-6.

## **THE CINCINNATI SHAPER CO.**

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SHAPERS • SHEARS • BRAKES





## AIRPLANE PROPELLER SHAFTS AT BARGAIN PRICES!

### from GISHOLT No. 24 AUTOMATIC LATHES

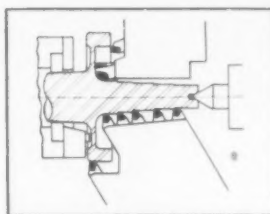
For speed and precision on these hefty drive gear and propeller shafts, production is divided between a pair of Gisholt No. 24 Hydraulic Automatic Lathes. The first machine gets the 275 lb. steel forging for nine different turning, chamfering, and facing operations on the 16" gear blank and five-shaft diameters. 12 minutes later, the part moves to the second machine where nine tools perform similar work on the other side of the flange. Time again is 12 minutes.

Together, the two No. 24 Hydraulics remove a total of 75 lbs. of material. One man operates both machines. Another tough job handled to perfection by these high production machines.

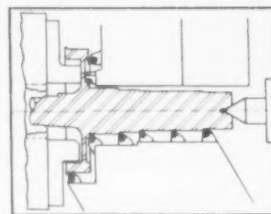
The Gisholt No. 24 Hydraulic, like the famed smaller No. 12 combines ease of setup with exceptional speed and accuracy—all with fully automatic operation that means low costs on any job. If you have work up to 24" diameter, you should have full details on the rugged, powerful, No. 24 Automatic.



First No. 24 making chips on small end of shaft.



Tool arrangement for first operation.



Tool arrangement for second operation.

#### THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



# GISHOLT

MACHINE COMPANY Madison 10, Wisconsin

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**ASSEMBLY LINE FOR MODEL 895 ENGINES.** In Lycoming's plant at Williamsport, Pa. Norton Grinding Machines are used in the grinding of components for this engine.

**BATTERY OF 17 NORTON MACHINES.** This picture shows an installation of seventeen 6" x 18" CTU Semiautomatics used for miscellaneous grinding of 80 different kinds of parts.



# LYCOMING USES 59 NORTON grinding machines on one big engine job

"Lycoming-Built Ordnance Continental Model 895 Engine." That is the official description of the product of the new Lycoming engine factory at Williamsport, Pa.

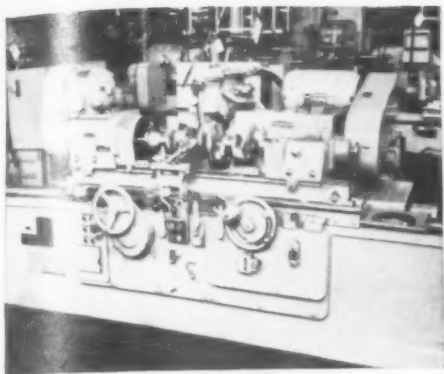
Model 895 is an army tank engine — 6 cylinder, horizontal opposed, air cooled, made in both supercharged and unsupercharged types. For the many grinding operations required to build it, Lycoming engineers selected 59 Norton grinding and lapping machines — an installation worth talking about, worth your serious consideration.

Some of Lycoming's Norton machines and the jobs they do are shown here. Perhaps you have jobs like these. Or perhaps your applications are entirely different. In either case, Norton will be glad to work with you on plans to fit standard or special grinding machines into your present or "post emergency" production.

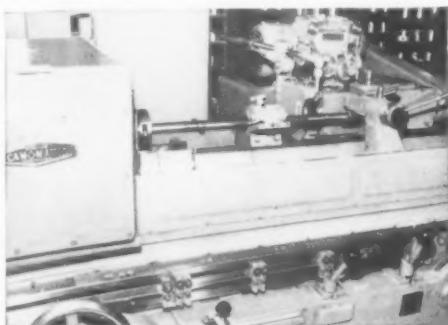
*Remember — only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost.*

For further information on the world's most complete line of grinders and lappers, see your Norton Representative or write us direct. NORTON COMPANY, Machine Division, Worcester 6, Mass.

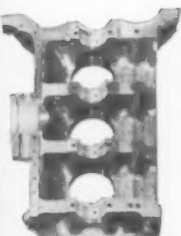
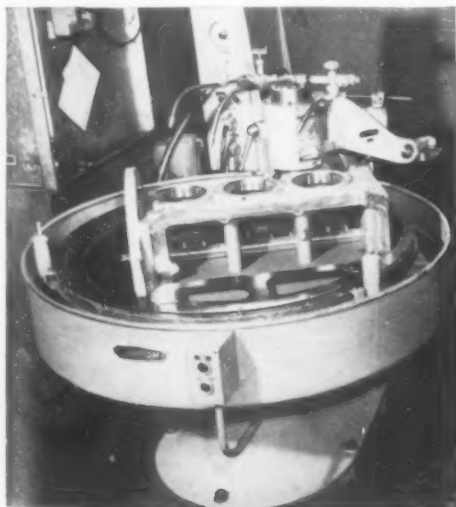




**MAIN CRANKSHAFT BEARINGS** are finish ground on Norton 14' x 36' LCTU Semiautomatic grinding machines. An interesting detail is that crankshafts are not centered to depth; therefore a base mounted locator is used on each machine. Crankshafts shown as forged and finish ground.



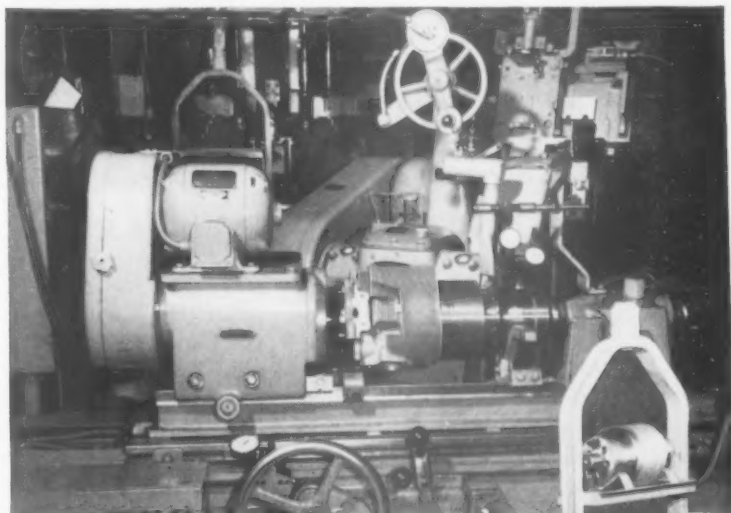
**CAMSHAFTS** are ground all over, with 3 grinds on the cam contours, all with small diameter wheels because of re-entrant curve. Norton 6' x 30' CTU Semiautomatic and No. 2 Cam-O-Matic machines are used. One of the latter is shown grinding the contours. Model 895 camshafts illustrated, before and after finish grinding.



**CRANKCASE JOINT FACES** are lapped on Norton No. 2F lapping machines, using 36" bonded abrasive laps. These machines do fast, precise work on soft metals, leaving a flat, clean surface which is free from imbedded lapping compound. View of crankcase shows the lapped surface.



**CAST ALUMINUM PISTONS** are used in the unsupercharged engine, forged aluminum pistons in the supercharged. All are ground on Norton 10' x 36' CTU Semiautomatic grinding machines, equipped with the compound Cam-O-Unit and the self-contained motor driven truing device which trues the wheel. At right: A Model 895 piston forging and the finished product.



**CYLINDER BARRELS** on the Model 895 engine require many intricate grinding jobs. Here a Norton 14' x 36' LC Angular machine is grinding the flange face and pilot diameter. Other Norton machines used in grinding this part are 10' x 36' LC Angular, 10' x 18' Semiautomatic and 10' x 36' Semiautomatic with Cam-O-Unit. Insert: Barrels in holding frame, ready for grinding.



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and to bring you*



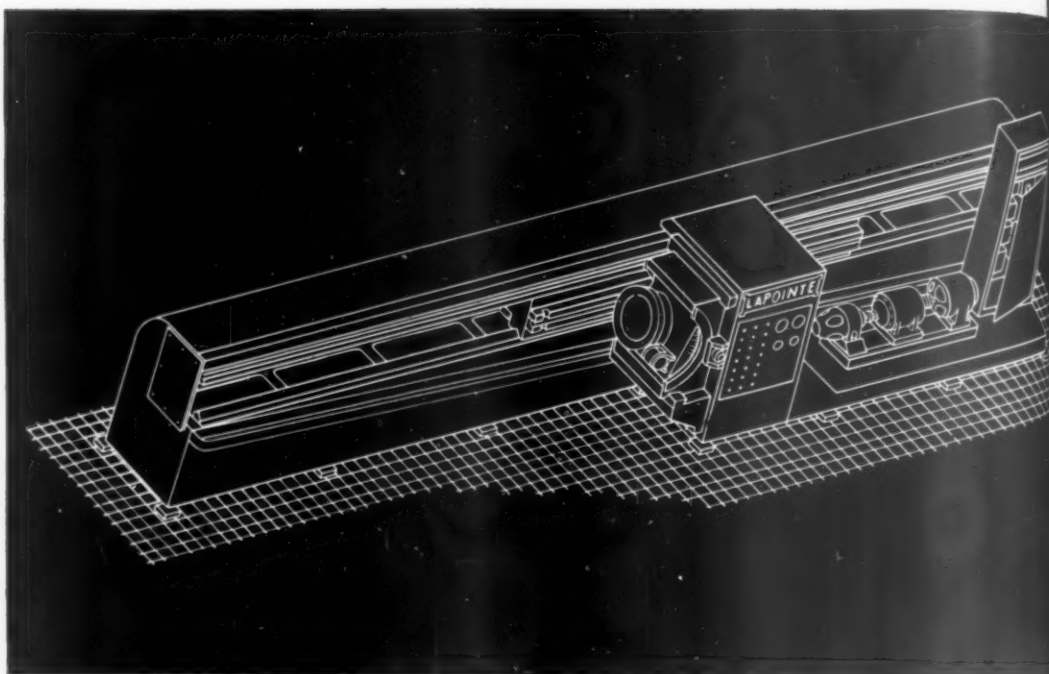
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**MORSE TWIST DRILL & MACHINE CO.  
NEW BEDFORD, MASSACHUSETTS**

# **LAPOINTE** breaks with tradition, and offers tomorrow's **BROACHINGS**



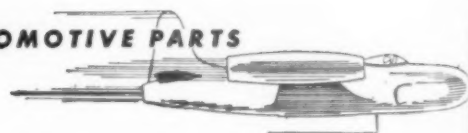
## capable of **BROACHING SPEEDS** in excess of **150 fpm!**

Faster than ever before, this DUAL SPEED Lapointe Broaching Machine is available with strokes ranging from 66 inches to 200 inches. All sliding members are lined with natural phenolic plates (another exclusive Lapointe feature) and slide on heat treated meehanite ways. Clamping fixtures operate on hydraulic power.

Rugged, heavy, and rigid, this machine can be equipped with drives up to 200 hp for smooth, powerful high-speed broaching. It embodies the capability, flexibility, simplicity and "guts" that no previously-designed broaching machine ever has had . . . and the maintenance factor is almost negligible.

In short, this machine represents exactly what industry has come to expect from LAPOINTE, the world's pioneer in the art of broaching.

**FASTER BROACHING OF JET ENGINE PARTS AND AUTOMOTIVE PARTS**





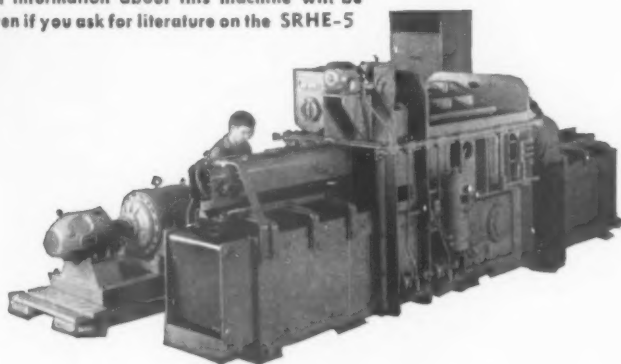
on, and, years ahead of time,

**IG SPEED** today!

**50** YEARS IN BROACHING!  
We're the oldest in the world.

1902 • GOLDEN ANNIVERSARY • 1952

Full information about this machine will be given if you ask for literature on the SRHE-5



View of machine during assembly

THE **LAPOINTE** MACHINE TOOL COMPANY  
HUDSON, MASSACHUSETTS • U. S. A.  
Branch Factory: Watford, Herts., England

HUDSON  
LAPOINTE  
MASS.

*This new*  
**LAPOINTE Electric Drive**

## **SURFACE BROACHING MACHINE**

removes the largest amount of material in the shortest possible time, due to its remarkable broaching speed of 150 fpm — and more!

No longer something to hope for in the future, this new machine has already completely proven itself . . . several have been in service for some time and are performing production miracles in nationally known plants.

## **DUAL SPEED gives great flexibility!**

An exclusive feature is the **DUAL SPEED** (patent pending), which makes it possible to broach at a certain predetermined speed for any part of the stroke, and at any other speed for the remainder of the stroke.

This opportunity to combine roughing and finishing operations in the same stroke indicates the machine's flexibility and is the reason why this newest Lapointe machine is so useful for the broaching of certain jet engine parts and automotive parts.

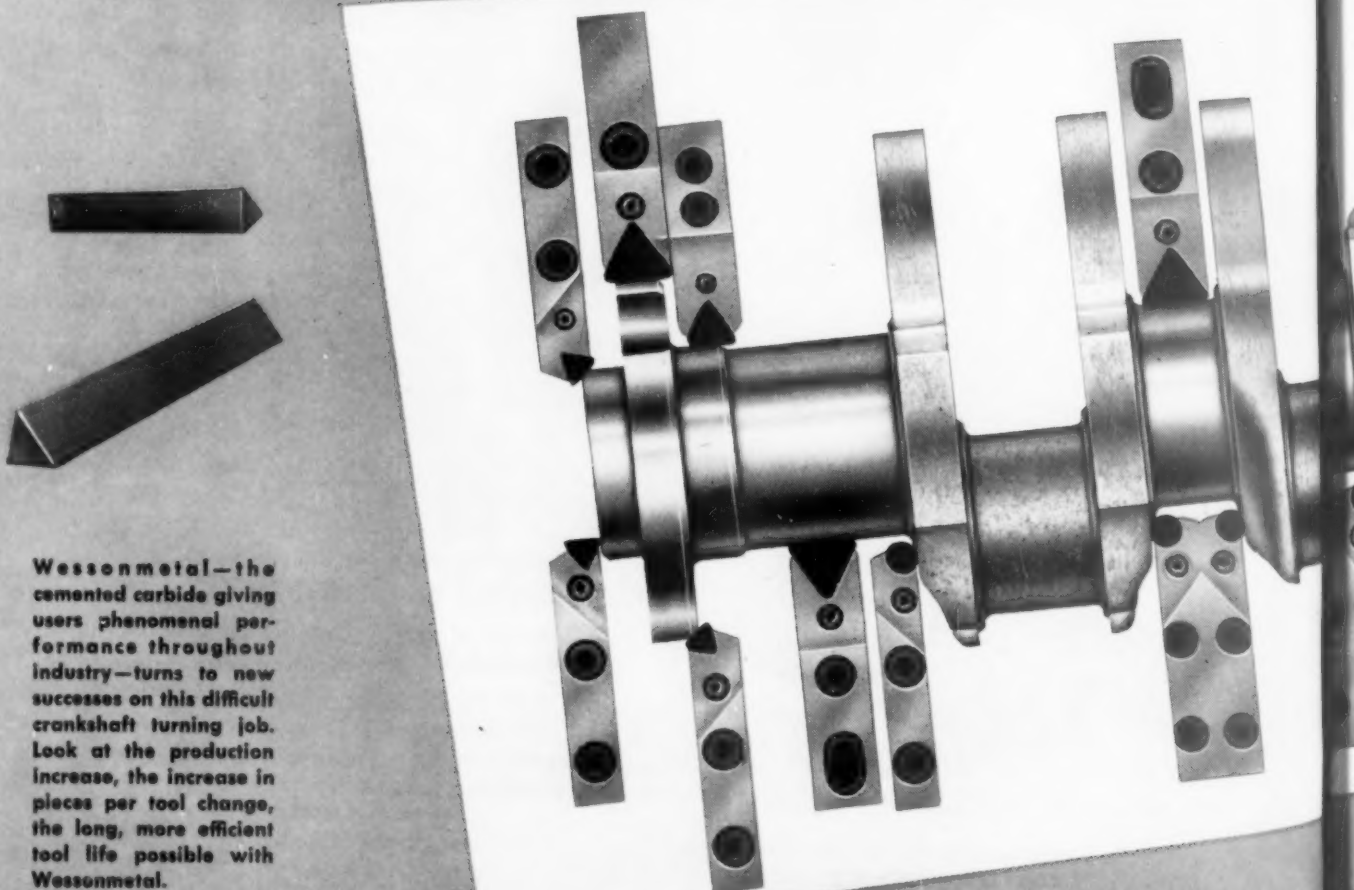
With this outstanding development in broaching — and others to come — it is well to remember now, more than ever, that Lapointe can accept responsibility for the complete job — broaching machines, broaching tools, and fixtures.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

**WESSONMETAL**  
TUNGSTEN-CARBIDE

**WESSON TOOL  
HOLDERS**

*First*



Wessonmetal—the cemented carbide giving users phenomenal performance throughout industry—turns to new successes on this difficult crankshaft turning job. Look at the production increase, the increase in pieces per tool change, the long, more efficient tool life possible with Wessonmetal.

**WESSONMETAL**

Plan view shows position of front and rear tools only.

**WESSON METAL CORPORATION**  
LEXINGTON 34, KENTUCKY

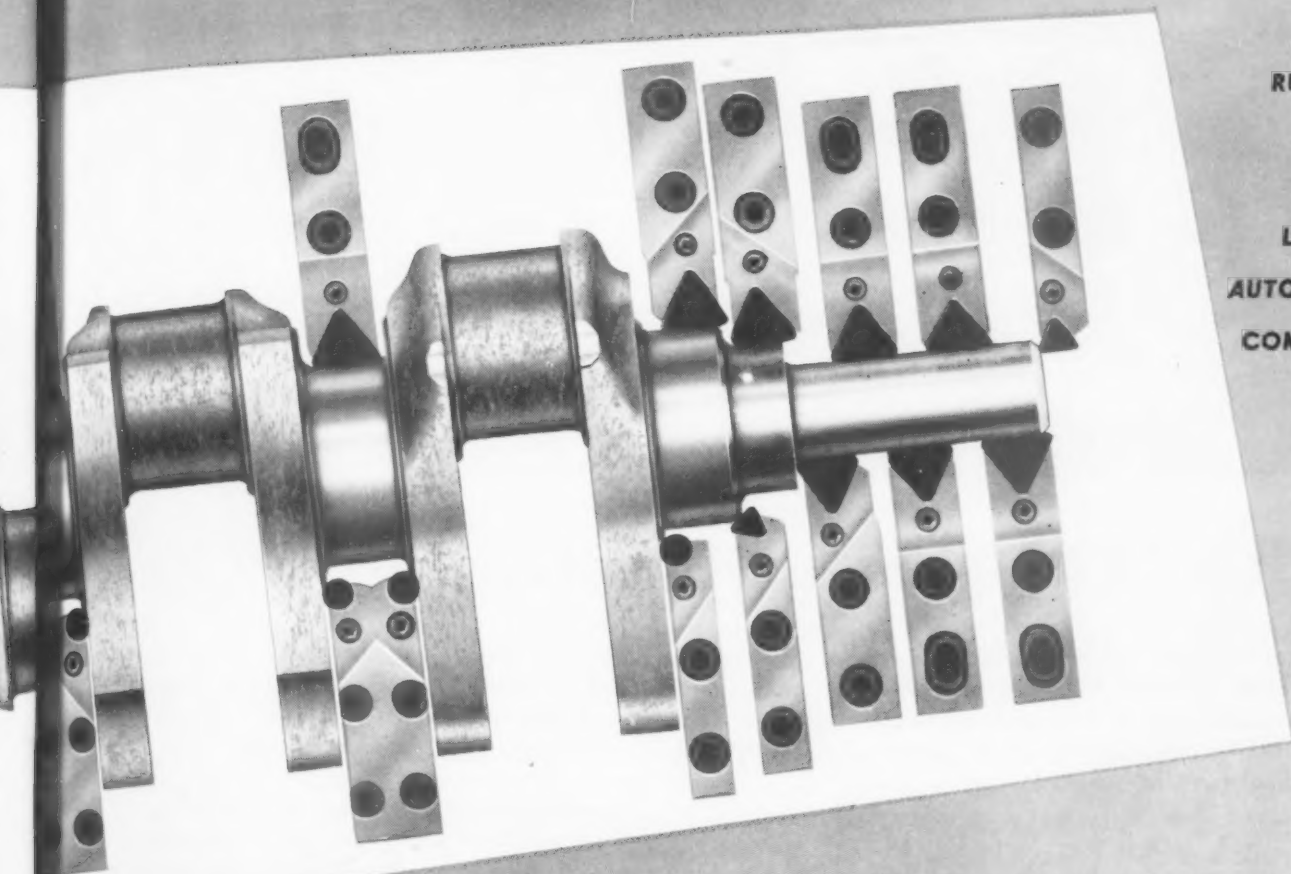
# **.10 TURN CRANKSHAFTS**

**with CARBIDE INSERT TYPE TOOLS**

**USING WESSON BAND TYPE TOOL HOLDERS**

**and WESSONMETAL SOLID CARBIDE INSERTS**

**ON LeBLOND AND WICKES LATHES**



**NOW  
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AT ONE  
OF THE  
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AUTOMOTIVE  
COMPANIES**

## **HERE'S OUTSTANDING PERFORMANCE!**

**AN AVERAGE OF 9000 PIECES PER INSERT BEFORE SHARPENING**

### **OLD METHOD**

Pieces . . . . . 11 per hour  
Cycle Time . . . . . 1 min. 55 seconds  
Crank per  
tool change (average) . . 1.7 pieces

### **NEW WESSON METHOD**

Pieces . . . . . 48 pieces per hour  
Cycle Time . . . . . 40 seconds  
Crank per  
tool change (average) . . 1500 pieces

# **WESSON COMPANY**

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**WRITE FOR  
Complete Story  
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## LESSON IN ECONOMY



*Carburizing Method - 93¢*  
*TOCCO Method - 48¢*  
*Savings per pin 45¢*

### with TOCCO\* Induction Heating

● When a leading motor truck manufacturer switched to TOCCO for surface hardening steering knuckle pins, they not only cut the cost of the part in half, but reduced heat-treating time from 17 hours to 48 seconds!

● Using TOCCO they were able to combine two operations and eliminate four others completely. Moreover, the TOCCO unit, being located right in the production line next to related operations, saves

approximately 4000' of hauling to and from the heat-treat department - an important economy factor not included in the above figures.

● If your operations involve the hardening, brazing, soldering, melting or forging of ferrous or non-ferrous metals, TOCCO can probably speed up *your* production and lower *your* costs, too. Why not ask to have a TOCCO engineer survey your plant for similar cost-cutting results - without obligation.



THE OHIO CRANKSHAFT COMPANY • CLEVELAND 1, OHIO



# TOCCO

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Induction Heating Equipment must meet the requirements of the Federal Communication Commission's Rules and Regulations Relating to Industrial, Scientific and Medical Services, Part 18. All TOCCO equipment is certified to comply with these rules and regulations.



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# The Tool Engineer

## Editorial

### The Tool Engineer in Our Modern Economy

Tool engineering is the profession which, more than any other, sets our own civilization apart from all previous civilizations. Its very foundation is the constantly increasing use of tools to relieve man of physical effort. Our standard of living is the direct result of having developed the use of tools to an art and a science. More and more we are all coming to realize that our wealth and economic strength are dependent on our continued ability to design and use better machines and tools to produce the things we need faster and better with less physical effort.

Tool engineering is a concept, an idea. It is the skillful use of the tools of production to bring about a harmonious meeting of technical knowledge and the hard facts of economics although a tool engineer is always interested in the economics of that process.

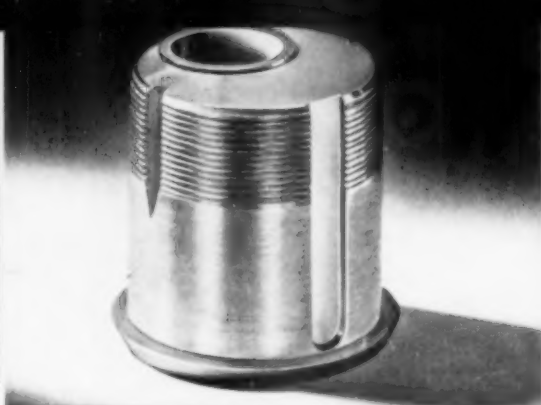
Therefore, the tool engineer has concentrated the vital economic functions of *How*, *Why*, and *With What* as related to manufacturing.

Many of our large industries are in complete agreement with the opinion that productivity is the only road to an economy of plenty, that machines are the friends of man, and that to produce more with the same amount of human effort is a sound economic and social objective. We therefore find many labor-management agreements containing a clause recognizing technological improvement. The General Motors contract, for instance, includes a clause providing for a 2.5 percent annual increase in productivity.

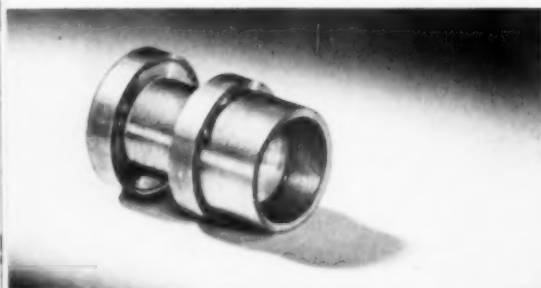
The acceptance of these new concepts of economics is a further challenge to our imagination, and with it comes also the sober realization of the immense responsibilities we are called upon to shoulder. It means that we must employ every means, every tool at our command to assist us in our daily professional duties. We must keep abreast of all requirements, technological advancements, and new developments as rapidly as they occur.

*L. B. Bellamy*

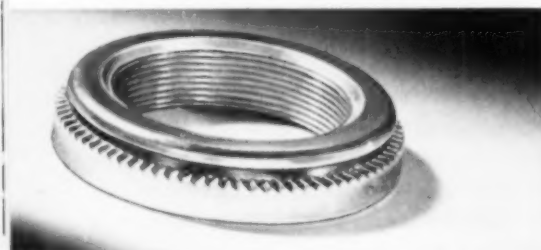
PRESIDENT  
1952-1953



**LOCK CYLINDER.** Metal: 1 3/8" dia. brass  
• Machine: model 601 New Britain Gridley  
• Operations: *cross slide*—rough form, finish form, break down cut off, side mill, vertical end mill, final cut off; *tool slide*—face, drill offset hole, ream and counterbore offset hole, thread  
• Spindle Speed: 1,324 rpm • Feed: .006" per revolution • Tools: high-speed steel • Cycle Time: 7.3 seconds



**CARPENTER'S PLANE PART.** Metal: 9/16" B1113 steel • Machine: Brown & Sharpe Automatic Screw Machine • Operations: *front cross slide*—form; *rear cross slide*—cut off; *turret*—feed stock, spot drill, drill 13/32" hole, tap drill, reverse spindle and tap left-hand thread  
• Spindle Speed: 1,180 rpm • Feed: .0025" per revolution • Tools: high-speed steel • Cycle Time: 30 seconds



**KNOB INSERT.** Metal: 1 7/8" round aluminum  
• Machine: model 61 1 3/8" New Britain Gridley  
• Operations: *cross slide*—form, knurl, cut off; *tool slide*—spot drill, tap, ream, recess • Spindle Speed: 1,600 rpm • Feed: .005" per revolution • Tools: high-speed steel • Cycle Time: 7 seconds

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Philadelphia 3, Pa.

I am having trouble possibly caused by an inadequate cutting oil. I would like ☐ the services of a Sun representative; ☐ the booklet "Cutting and Grinding Facts."

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Company

Street

City  Zone  State



**MORE THAN 300 PARTS ARE MACHINED** with the aid of *one* cutting oil for tools and hardware items made by Sargent & Co. Raw materials worked are: B1113 steel, 11ST-3 aluminum, ASTM-B140-46 Type B half-hard bronze, B16-46 brass, and Type 416 stainless steel. Stock ranges from 1/16" wire to 2" bars.

## SINGLE GRADE OF SUNICUT REPLACES 4 CUTTING OILS

A good example of cutting-oil economy and efficiency is provided by Sargent & Co., well-known hardware and tool manufacturers. Their complete line requires the machining of more than 300 parts from a wide range of metals. A few years ago this company was using four different cutting oils, purchased in drums. By switching to a single product, Sunicut 11W, and buying it in bulk, Sargent has been able to effect an annual saving of about \$3,000. All operations are performed as well as before, or better—and shop efficiency is up.

Sunicut 11W is a low-viscosity, dual-purpose cutting oil for automatics machining all nonferrous metals and free-machining steels such as B1112 or B1113. Its transparency permits quick and accurate miking. It will not stain brass or copper under normal conditions. It drains rapidly, minimizing carry-off. And its high lubricating and cooling properties aid in prolonging tool life and improving finishes. Moreover, it protects finished parts from rust and corrosion.

*Other Sun cutting oils offer similar opportunities for improved operations and economy. For information about them, or the help of a Sun representative, use the coupon*

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## THE TOOL ENGINEER

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# The Tool Engineer

## Teamwork, the Great American Custom

Generally recognized, teamwork is the backbone of our outstanding achievements which have made America great. Combined behind our industrial products are the efforts of the pure scientists, researchers, designers and tool engineers. Without the contribution of any group in this chain, products would not be available in the quantity and quality to which we are accustomed. In fact many would never reach production.

Traditionally, the tool engineer views the designer as an impractical, long-haired engineer without sufficient understanding and knowledge of production methods and problems. The designer can always create production headaches and specify unnecessarily close tolerances. Viewed from the designer's angle, however, the tool engineer hesitates to try new approaches to production, hanging onto time-proved methods.

Fortunately, this balance-wheel effect between the tool and design engineers works for the public good, the former assuring that new products may be mass produced and the latter striving to develop newer and better products. Greater appreciation of the other's contributions to our material wealth could accelerate progress, and would only be exceeded if the innate characteristics of each could be possessed by both.

In spite of the fact that many production men regard the designer as an impractical dreamer, his thinking was not sufficiently advanced to design certain strategic weapons, such as the atomic bomb, during World War II. Developments in research and basic information were so rapid that physicists were required to design and build these weapons. Engineers didn't have the background for this race against time.

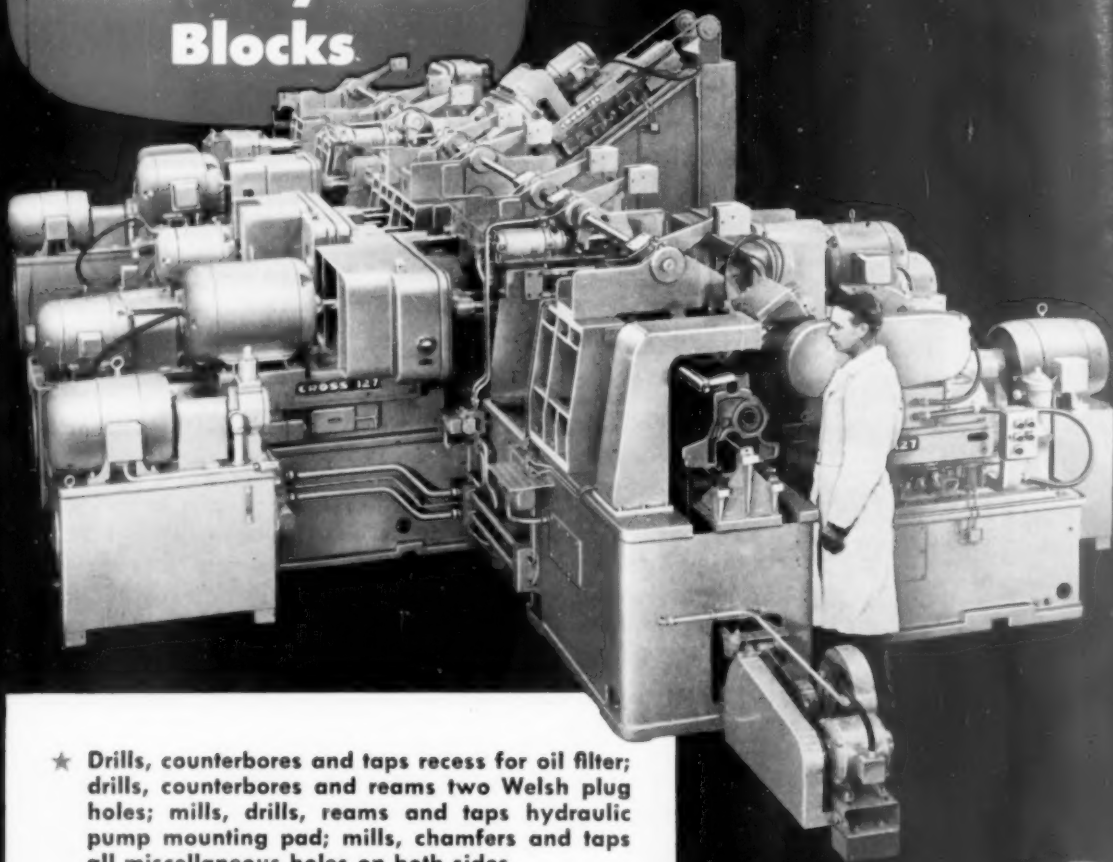
Normally, in an industrial economy, such basic information would progress through the regular channels and reach production through the hands of the tool engineer. Although slower, the normal process is less costly and usually results in a superior product. Refinement of design through this "filtering" process is the teamwork not always apparent but ever present.

*John W. Greve*

EDITOR

# Mills, Drills, Bores and Taps Tractor Cylinder Blocks

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- ★ 71 pieces per hour at 100% efficiency.
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- ★ Hydraulic power operated transfer mechanism moves work from station to station.
- ★ Other features: Construction to J.I.C. standards; automatic chip conveyor; automatic air-oil tap lubricating and cleansing with each cycle; automatic, gravity operated cam clamping; automatic retraction for milling cutters during return stroke.



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# Metal Stampings

produced with latest handling methods  
at new Ford plant

By John W. Greve

ALTHOUGH NOT FUNDAMENTALLY different in individual details from other stamping plants in the automotive industry, the new Ford plant at Buffalo combines the latest practices in automatic handling, straight-line production and good housekeeping. In starting from scratch with this new plant, management embodied the objectives of increased safety to personnel through minimum manual handling of materials flowing through the plant, *Fig. 1*. These objectives have paid off in better quality products and greater utilization of press capacities.

Making body parts for Fords, Mercurys and Lincolns, this plant has a complete tool and die department with heat-treating facilities for producing jigs, fixtures and dies. Nineteen major stamping lines for body components, a miscellaneous stamping department for small part assemblies, welding sections, and an assembly conveyor for body side assemblies—all are laid out for tying in with straight-line production methods. Incoming material, mostly coils of steel strip, is received by rail or truck at one side of the plant and stored close to the blanking and flex rolling equipment associated with the press line. Finished body parts flow direct through processing to rail sidings on the opposite side of the plant for shipping.

**Presses:** Each of the nineteen major lines produce a special part, the number of presses and associated equipment being dependent upon the part requirements. These major lines produce instrument panels, cowl panels, inner and outer panels for front and rear doors, roof rails, center pillars, inner and outer luggage compartment panels, dash panels, rocker panels, quarter panels, back panels, front and rear floor pans and roof panels. In the miscellaneous press department, over a hundred small stampings are produced in straight-side presses and are the component parts which go into the major assemblies. Layout of the stamping



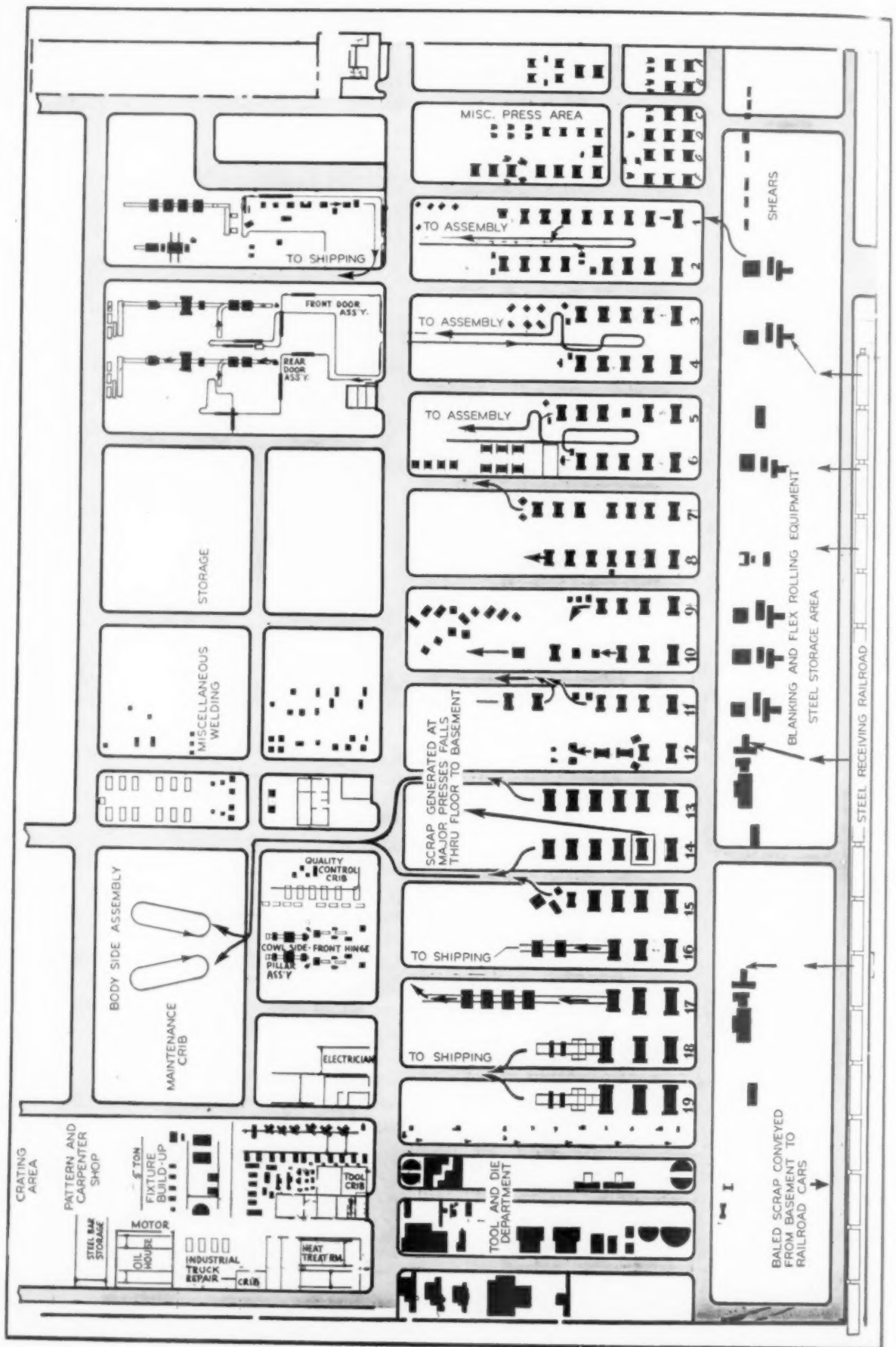
lines showing the press arrangements and the flow of materials through the plant is shown in *Fig. 1*.

The largest stamping requires a blank 68 x 118 inches and is used in the line for making station wagon roofs. The smallest part, produced in the miscellaneous section is a little clip about  $\frac{1}{2}$  x  $\frac{3}{8}$  inch. In the major lines the usual order of presses after blanking is (1) forming, (2) piercing and trimming, and (3) restriking and flanging. Usually the part is turned over automatically after leaving the first press for positioning in the piercing and trimming dies.

Most complete line insofar as automatic handling is concerned and typical of a line embodying latest practices is that producing front floor pans. On this line, consisting of three presses and four welders, operators load only the blanks feeding the first press and unload the conveyor receiving the finished pan at the end of the line. Reinforcements, however, are manually loaded at the welder stations.

To supply this line, called line 17 in *Fig. 1*, steel is handled from storage by overhead cranes to cleaning and leveling rolls. Then it is delivered to automatic blanking presses where it is trimmed to size and stacked for delivery to the press line. From there the blanks are delivered by tractor and deposited on loading pedestals in front of the blank loader feeding the first press. Operators feed the loading device, *Fig. 2*, manually.

When a blank is in position on the loader, fingers on two chains, timed in sequence with the press ram, feed the first press. This press performs the



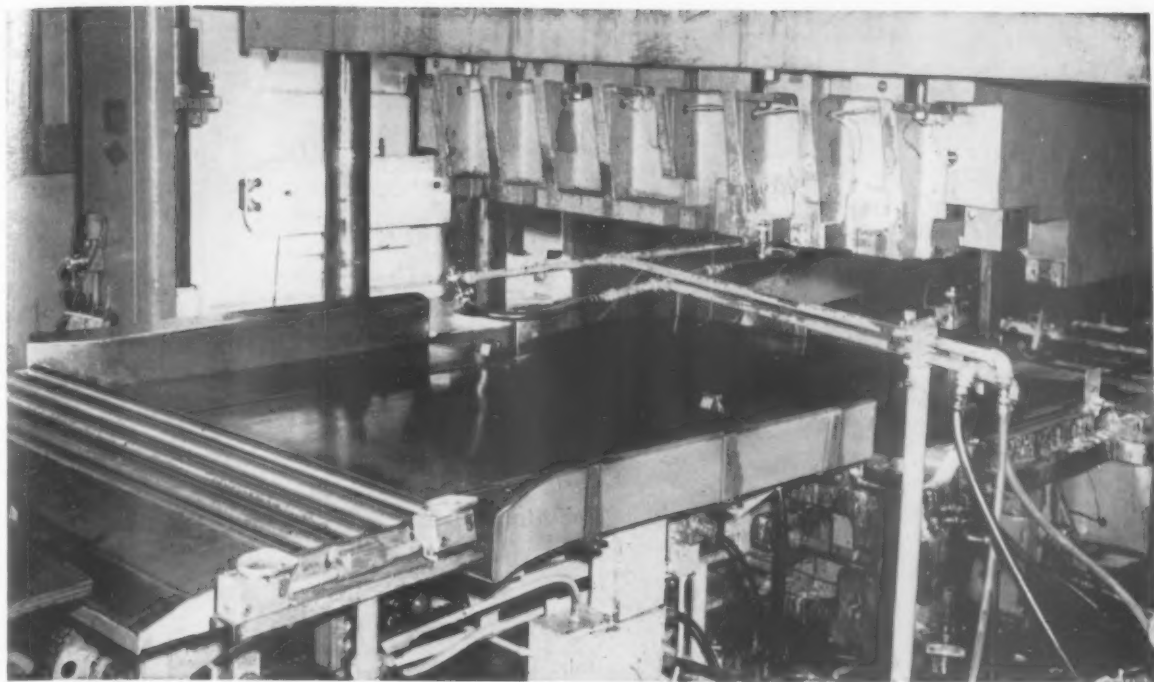


Fig. 2. Automatic loader feeds the first press in the floor pan stamping line.

drawing operation and has a .100 x 180-inch bed with triple-action.

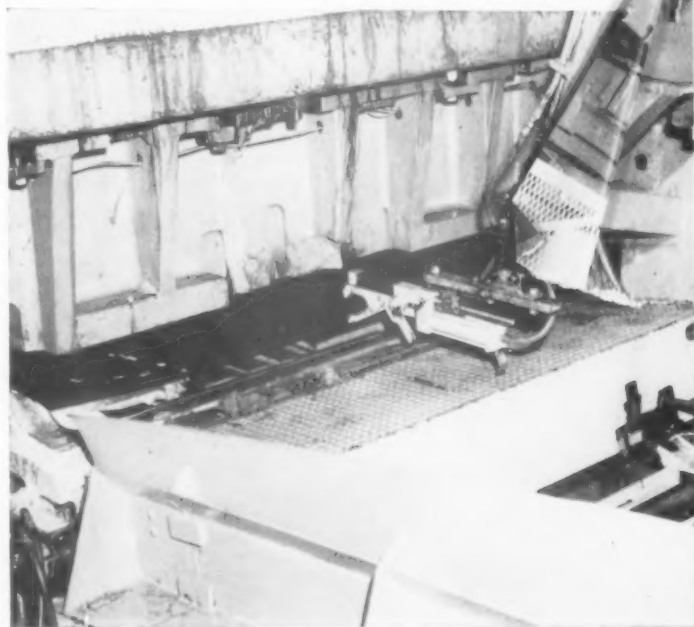
As the sheet is fed into the press and when necessary due to depth of draw, lubricant is sprayed on the blank. The spray gun is tripped automatically as the sheet passes into the press. On the return stroke of the press after the blank is formed, an Iron Hand, *Fig. 3*, clamps the part and deposits it onto the conveyor feeding the second press in the line while the loading device starts another blank into the press. All of these motions are synchronized with the ram movement as are also the succeeding presses in the line.

Differing from other press lines in the plant, no turnover is required after forming to position the workpiece for the piercing and trimming die. The drawn pan is deposited upright on a four-station transfer while another drawn part is being fed into the second press. These feeding fingers are seen in *Fig. 4* and operate similarly to those feeding the forming press at Station 1.

The Station 2 press, with a 180 x 100-inch bed, 1000-ton Danley, pierces and trims the part, operating automatically from two limit switches, contacted by the pan when it is in position. An

attendant only observes its functioning. In case the press must be stopped for any reason or if the automatic handling equipment fails to operate properly, the attendant depresses a safety button to halt the operation. In *Fig. 5*, an Iron Hand has clamped the pierced and trimmed part for removing it from this press. Trimmings from the pan are ejected onto a short conveyor traveling across the back of the press. A chute at the side receives the trimmings, delivering them to receivers on the floor below.

Between the second and third press is another



*Fig. 1* (at left). Layout of press lines for major components and miscellaneous stampings, indicating straight-line material flow from raw material to assembly and shipping on the other side of the plant.

*Fig. 3* (at right). The formed pan is removed from the first press and deposited onto a four-station transfer conveyor feeding the second press in the mechanized line.

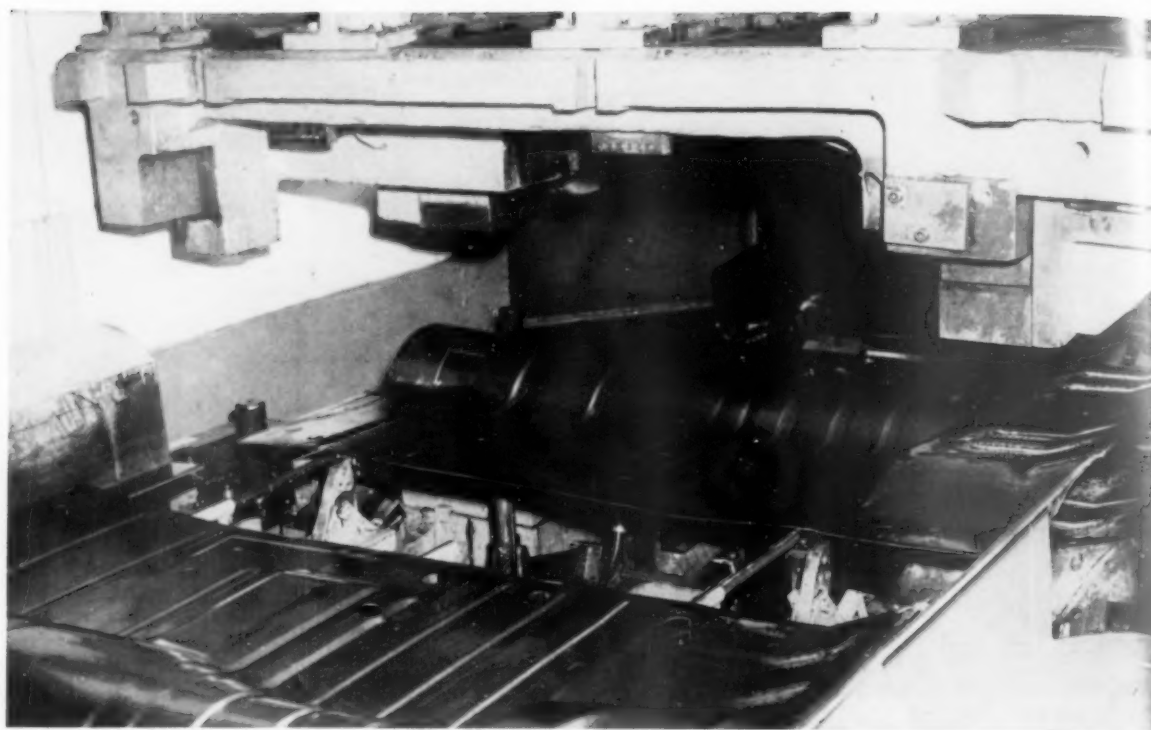


Fig. 4. Transfer conveyor feeding the second press which pierces and trims the pan.  
Operation of press is automatic when the part falls into position.

transfer unit, Fig. 6, feeding the part into the third press for a restriking and flanging operation. This operation employs a 132 x 84-inch press having 1000-ton capacity. Another Iron Hand, Fig. 7, unloads the press and deposits the part on an inclined conveyor feeding a battery of resistance welders. Through all three presses the parts progress with-

out being touched by human hand beyond stacking the feeder for the first press.

Limit switches or locating gages are also employed on the third press. They are located in the dies in such a way that the press operates only if they are tripped by the part when it is in proper location.

**Welders:** While traveling up the inclined slat conveyor after ejection from the third press, the pan is turned 90 degrees at a station midway on the conveyor.

This positions the pan for delivery to the welders. As the pan travels, it trips a limit switch and a lever, operated by an air cylinder, turns the part a quarter turn. The pan then continues up the conveyor to the loading station of the first welder.

A battery of four resistance welders, Fig. 8, completes the pan for delivery to shipping. After delivery from the slat conveyor, the pan falls onto an automatic loading station and contacts a limit switch to start the feeder moving forward into the first welder. In this position, operators place pan reinforcements on each side of the panel. After welding, the panel is transferred automatically to the second welder where additional reinforcements are positioned and welded.

Fig. 5. Pan is removed from second press and deposited onto another conveyor feeding the third press. Trimmings from this press fall onto a transverse conveyor and are delivered through a chute to the floor below.

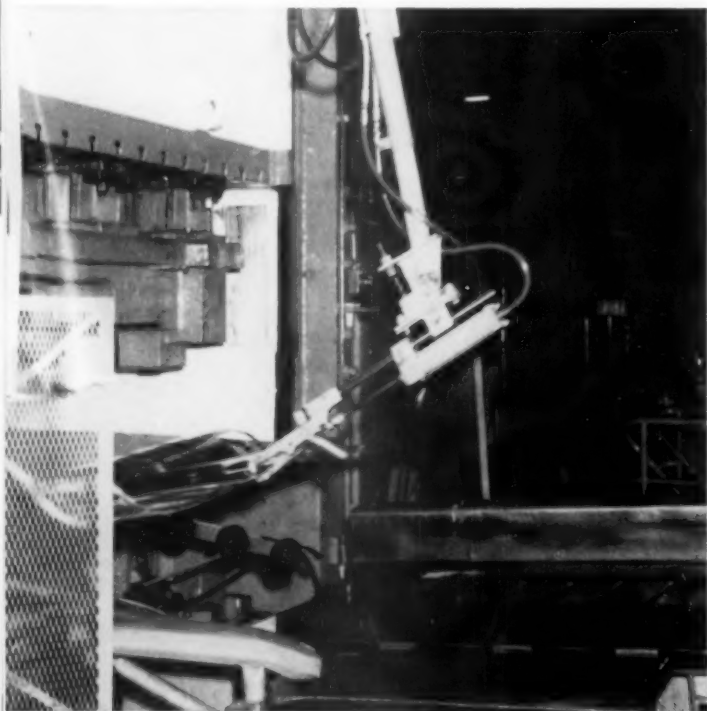






Fig. 6. Pierced and trimmed pan is fed by transfer unit to the third press in the automatic line. Restriking and flanging operation is performed at this station.

The third and fourth welders in the battery are employed only for adding additional welds. In other words, more welds are required on the panel than can be made in the first two welders. All the operations, other than loading the reinforcements, are automatic.

**Disposal of Trimmings:** One major factor in the efficient operation of the plant is the effective disposal of trimmings. All trimmings from the major presses are delivered by short conveyors to the press side where they are chuted to loading carts on the floor below. These carts are picked up by a tractor and made into trains for delivery to the baler. As a loaded cart is picked up, an empty one replaces it beneath its chute.

These carts are delivered to two rotary unloaders which dump the trimmings onto conveyors. A pneumatic cylinder spots each car in the dumping units where they are uncoupled and turned over. Because the carts are coupled in a train, a car is always in position for the next unloading operation performed by the air cylinder.

Conveyors from each unloader carry the trimmings to two balers. Resulting bales are pushed onto a conveyor which transports them underneath the roadway and up over a rail siding for loading into cars. A television transmitter is focused on the

loading position and a receiver is positioned at the balers so that the operators may observe the loading of the cars in the yard.

As the conveyor loads the bales the cars are spotted remotely by the operator. During the spotting operation, a safety gate closes at the delivery end of the conveyor while the car is moved to a new position by cable and winch.

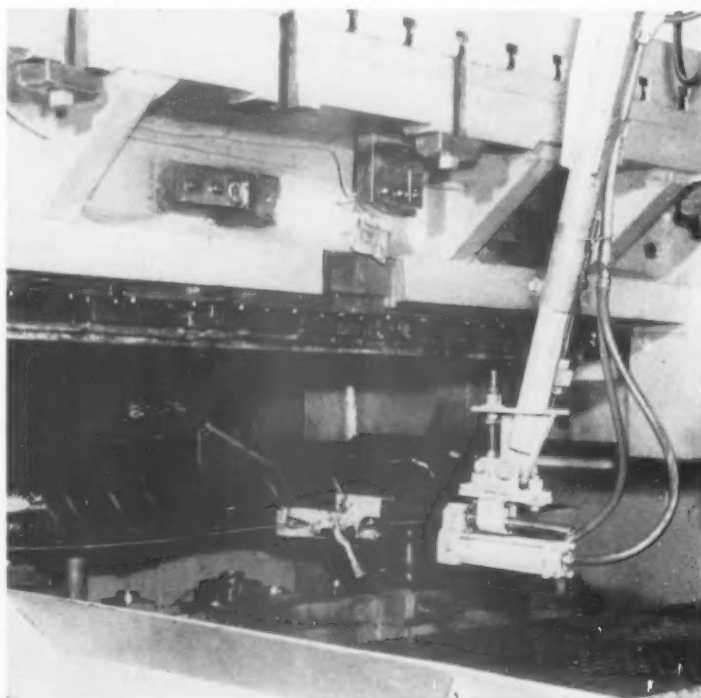


Fig. 7. Finished stamping is unloaded from the third press by an Iron Hand, depositing the pan onto a slat conveyor feeding the welders. Limit switches permit press operation only when part is properly located.

**Die Changeover:** Some press lines produce more than one part. For this reason all the dies in the plant are color coded—orange, blue or black—for Ford, Mercury or Lincoln designs respectively. Die changeovers are made daily. In this way five parts, each requiring the same type of press, can be run on the same line in a week. On such parts, the dies are usually changed during the night.

Dies are stored near the presses and can be changed readily with overhead handling equipment. The dies, all being designed for the same shut height in their respective presses, require little or no adjustment before being put into operation.

**Safety:** Operations at the Buffalo plant are predicated on the fact that the safety department is a staff function. The safety engineer makes both recommendations and suggestions to the production departments. On request, the department makes analyses of past performance or of potential hazards and submits recommendations to the supervisor involved.

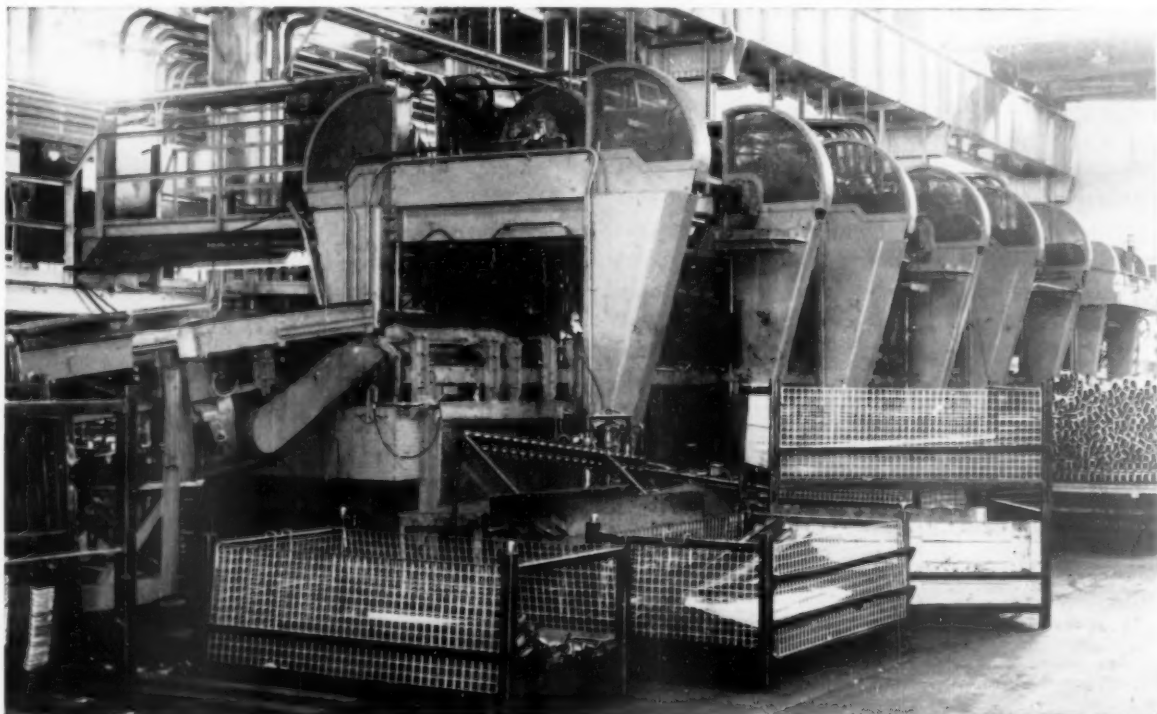
The entire plant operates on the principle that safety is first and foremost in all operations. It has the unqualified backing of top management and carries through to every supervisor from plant manager on down. A safe employee is, first of all, the best safety factor in the plant. He is, however, only as safe as his training program makes him and as potential hazards are minimized by management.

One of the outstanding methods or approaches toward that goal is automation. By automation is meant the use of mechanical handling equipment. Automatic handling equipment in metal stamping operations has become a big factor in safety practices. Operators load the automatic handling equipment instead of a press. The automatic loader, in turn, loads the press.

Good housekeeping is also an important factor. Management believes that the quality of housekeeping is related in direct proportion to accident rates. Considerable attention is paid to this aspect of the company's program and management goes to considerable lengths to stimulate enthusiasm and participation in keeping the plant clean by recognition of those areas or departments which excel in housekeeping.

A new plant presents definite advantages and disadvantages in effectively operating a safety program. The advantages include the fact that manufacturing operations may be laid out and coordinated in such a way that the latest safety practices may be incorporated. Rearrangement of equipment often is not involved and space may be provided as needed without sacrificing or compromising with other work areas. The limitations, although minor, involve the lack of previous records insofar as a particular layout is concerned. Also, unrecognized safety problems may arise as a result of an improvement planned to eliminate a known operating limitation.

**Fig. 8.** Battery of four spot welders operate automatically and finish the pan for assembly in a car. Reinforcements to be welded to the pan are manually loaded into the first two welders.



# Gadgets

Ingenious Devices and Ideas to Help  
the Tool Engineer in His Daily Work

## Feeler Switch

A feeler switch assembly, used in conjunction with a remote controlled lateral shifting installation on General Drivmatic riveting machines has completely eliminated the danger of pressing rivets too near the edge of hat section stringers at TEMCO Aircraft Corp., Dallas, Texas. The device automatically holds the riveter clamp within a set distance of the stringer edge.



Specifications require that the distance between the edge of the stringers and the center of rivet holes must be held within certain tolerances, a difficult task in cases where stringers are not absolutely true. Previous to the development of the feeler switch assembly, the operator had to use his own judgment in compensating for warped stringers.

The switch assembly, which is mounted on the lower ram clamp assembly of the riveter, consists of two units, each of which contains two 10-ampere, 115-volt Thin Nest precision coin switches of the type used in coin operated vending machines. Each unit has a finger-like actuator which requires only  $\frac{3}{32}$  in. movement to actuate either of the two switches in the unit.

The actuators of the feeler switch assemblies are partially concealed in vertical recesses which are cut in the redesigned clamps. When the riveting machine is in operation, the switch actuator is in constant contact with the side of the hat section stringer. If the stringer moves too far from or too close to the clamp, the actuator energizes one of the two coin switches, thus energizing the lateral shifting mechanism and returning the stringer to its proper position in relation to the clamp.

Two feeler switch assemblies are used on each machine to make riveting operations possible on both sides of hat section stringers. When the clamp

is raised to its working position near the bottom of the panel, a roller switch and cam assembly automatically disengages the manual controls of the panel shifting installation, making it impossible for the operator to damage the panel or clamp by running a rib or stringer into the clamp. When pressure is applied to press rivets, the feeler switch assembly is automatically disconnected to prevent scratching the under surface by the panel being shifted under pressure. When the rivet is pressed and the pressure relieved, the feeler switch circuit again becomes activated.

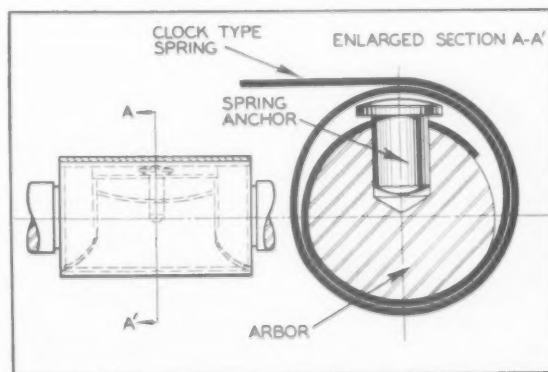
The operator may, by means of a single toggle switch, cut the feeler switch assembly out of the circuit and return the machine to complete manual control. The assembly may be removed from the machine for repair or adjustment in a few minutes.

*C. H. Rowan  
Dallas, Texas*

## Clock Spring Stresses

Failure of clock type springs is often traceable to excessive localized stresses caused by coiling the spring over the spring anchor on the arbor. The sketch below shows a design developed to reduce these spring failures.

The conventional method of attaching the spring to the arbor is followed, with these exceptions: an eccentric portion is turned on the arbor as shown. This eccentric portion serves as a seat for the spring, recessing it to the extent that the next coil passes over, without actually contacting, the arbor.

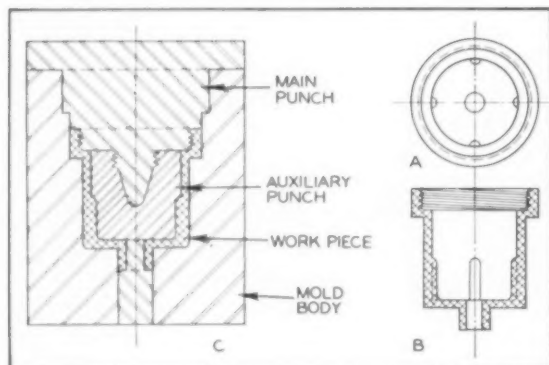


The end of the spring is reduced to a width which will permit it to nestle into the eccentric portion of the arbor. As the first coil winds onto the arbor, it gradually widens and therefore blends onto the concentric portion of the arbor, thus clearing the spring anchor.

*Ernest J. Druan, Jr.  
Cambridge, Mass.*

## Plastic Mold Design

The plastic molding shown here presented a difficult problem because of the presence of a threaded portion and four vertical ribs in the interior of the molding. If the punch is made in one piece, it is impossible to unscrew the molded piece from the punch because of the ribs. Therefore, it is necessary to use a composite punch.



The usual method of constructing a composite punch could not be used here because of the very small difference in the diameters of the two punch sections. The solution is shown in the sketch. The separation of the two sections of the punch is not concentric but transversal. The main punch carries a central taper nose and corresponding threaded portion. The auxiliary punch has a perfectly matched tapered hole for alignment and a female threaded part for fastening.

The complete cycle is as follows: (1) At the open mold the auxiliary punch is securely screwed in place on the main punch. There must not be any opening between the abutting surfaces of the two punches. A thick flash here will cause trouble later. (2) The cavity is then filled and the mold closed for curing. (3) After the mold is opened, the workpiece, together with the auxiliary punch, is unscrewed from the main punch. The pitch of the fastening thread of the auxiliary punch must, of course, be the same as the pitch of the workpiece thread. (4) The auxiliary punch is then separated manually from the molding by a short rod and hammer.

Federico Strasser  
Santiago, Chile

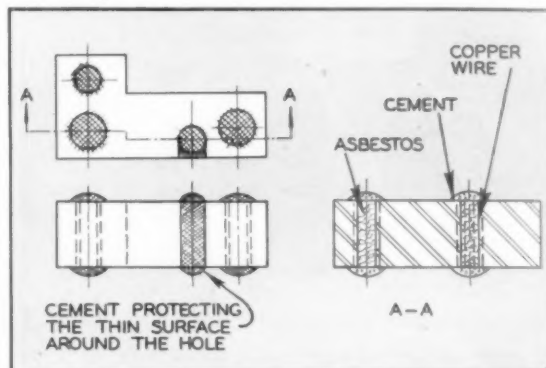
## Tool Steels

With proper design and heat-treating practices, it is possible to use water-hardening tool steels for a large number of tools. Tools and dies should be given generous fillets and round corners when possible in order to minimize internal stresses. Heat treating is a very important operation when using this type of steel because of the high internal stresses created by the fast cooling rate. Before hardening, holes should be packed with asbestos and sealed with cement as shown in the illustration, and then

baked until the cement is dry. Edges located near holes should be protected with cement. The cement is held together with a copper wire and is also baked until dry. This procedure will prevent the danger of cracking but the protected surfaces will not have a high hardness.

If available, a lead pot furnace should be used to heat the steel since pieces remain free from scale and harden more uniformly. The quenching medium should be water mixed with about 10 percent brine at approximate temperature of 70 deg. If the water is too cold, the carbon, instead of being expelled from solution, is entrapped as a supersaturated solution which produces a highly strained and very unstable structure.

The steel should be heated slowly and uniformly to the hardening temperature and held at that point until the temperature is uniform throughout the cross section. This temperature should be above 1333 deg F when the steel structure is austenite.



Tempering should follow hardening in order to obtain a more stable structure and at the same time relieve internal stresses. The process should be slow and 30 minutes should be allowed for each inch of cross section. Tempering up to 400 deg F does not appreciably change the hardness of the steel. As the temperature is increased, the hardness decreases steadily. The cooling medium after tempering has little effect on the structure of the steel, and water, air or oil may be used.

Sometimes a thin, very hard surface is desired together with a soft core. In such cases water-hardening tool steels should be heated to 1500 deg F in a cyanide bath and then quenched in oil. The hard surface will have a depth from 0.004 to 0.006 in.

(Reference: Sisco, Frank T., *Modern Metallurgy for Engineers*, pp 97 and 112. Pitman Publishing Co., N.Y. 1948.)

Peter Balsells  
Dayton, Ohio

*Contributions for these pages describing short cuts for the tool engineer are welcome. Finished drawings are not necessary. Payment for accepted articles is made upon publication.*



# Diamond Pin Locators

By E. J. LaBroad

**O**BSERVATIONS IN SHOPS using jigs and fixtures where a diamond pin was employed showed that frequently the corners of the pin were either filed or stoned off. The reason for this was found to be that the parts were too difficult to load. The center distances of the part and fixture were within tolerances specified on the drawings. When this fact was established, the diamond pin was checked. This examination showed that the flat or the amount of locating surface on the diamond pin was too large. In most cases, the flat was based on either being one-third or one-fourth of the locating diameter. This one-third or one-quarter rule has been found to be approximately correct only under certain conditions. It holds true where one-half

the sum of the component part center distance tolerance and the component tool center distance tolerance is equal to 0.001 inch or less. For any other condition the rule does not hold true. In fact, if it were used, it would result in interference between the hole and the diamond pin. When this happens, the machine operator then stones or files off the corners so that the part will drop over the pin. This in itself is not too serious except for the fact that the machine operator has been forced to alter the pin. The most serious result of this occurrence might be that in filing the corners, the diameter may have been altered. This would result in excessive radial movement of the part.

There should be no need for the operator to alter the diamond pin. This is a function of the tool engineer and should be included in the design on the original drawing. The following formulas have been derived for this purpose. (Fig. 1), and from them TABLE 1 has been developed:

$$(1) A = \frac{C^2 - B^2 - K^2}{2K}$$

$$(2) D = 1.732A + \sqrt{B^2 - A^2}$$

$$(3) E = 2A$$

where

K = one-half the sum of the component part print center distance tolerance and the component fixture center distance tolerance.

C = radius of minimum locating hole diameter.

B = radius of maximum pin diameter

A = one-half the width of the pin flat

The table is based on part center distance tolerances

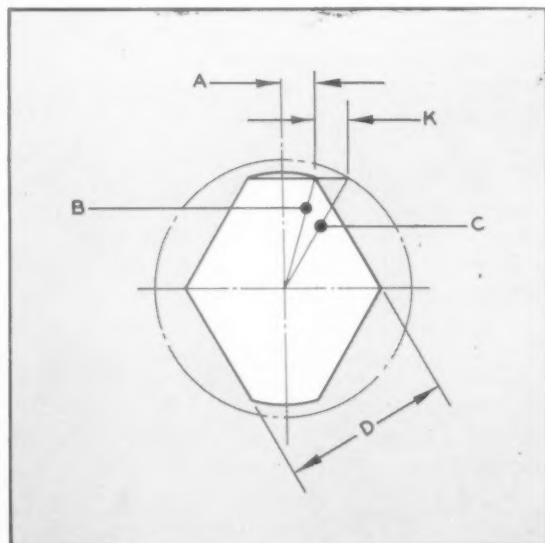


Fig. 1. Part center distance tolerances and tool center distance tolerances are shown here.

and tool center distance tolerances as shown in Fig. 1, and the diamond pin being from 0.0008 to 0.0005 inch loose in the minimum diameter locating hole. The minimum flat allowable was set at approximately 0.015 inch. This is the reason there are no figures for some cases in the table. Where there are no figures given, the formulas given below should be used:

$$(4) B = \sqrt{C^2 - K^2 - 0.016K}$$

$$(5) D = 0.01386 + \sqrt{B^2 - 0.000064}$$

$$(6) \text{Pin OD} = 2B$$

In these instances, a flat of 0.016 inch has been established, and the formulas will give the maximum diamond pin diameter and distance across the flats. After using formulas 4, 5 and 6 to determine the diameter, a check should be made to see that the amount of radial movement of the part (pivoting from the full pin) is not in excess of the tolerances specified on the part drawing. If this radial movement is excessive, the part drawing center distance tolerance must be held closer. If this is not possible, some other means than a full pin and diamond pin must be used for locating.

On some drawings the detailing or dimensioning of the diamond pin is incorrect. See Fig. 2. In these instances the amount of flat (dimension *E*) was given instead of the *D* dimension. This forced the tool or gage maker, if he were to make an accurate diamond pin, to calculate the *D* dimension in

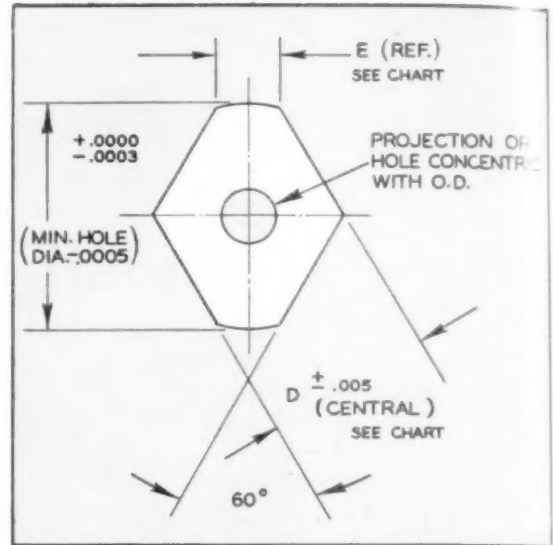


Fig. 2. Correct method of dimensioning.

order to make the pin. For practical purposes, the *D* dimension should be specified and the *E* dimension, if given, can be used as a reference figure. For inspection purposes after assembly, a projection or hole ground concentric with the diamond pin diameter should be provided.

Actual experience has shown that diamond pins designed according to these formulas and table have provided more accurate locating and there has been no interference in loading the parts.

TABLE 1—Maximum OD for Diamond Pin Locators.

Pin Diam (Max)		.1245	.1870	.2495	.3120	.3745	.4370	.4995	.5620	.6245	.6870	.7495	.8120	.8745	.9370	.9995
K = .001	E	.030	.046	.062	.077	.093	.108	.124	.140	.155	.171	.186	.202	.218	.233	.249
	D	.087	.130	.174	.217	.261	.305	.349	.393	.437	.480	.524	.568	.611	.655	.699
K = .0015	E	.020	.030	.040	.051	.062	.072	.082	.092	.103	.113	.123	.134	.144	.155	.165
	D	.077	.117	.157	.197	.237	.277	.317	.357	.397	.436	.476	.516	.556	.596	.636
K = .003	E			.017	.023	.028	.033	.038	.044	.049	.054	.059	.064	.070	.075	.080
	D			.139	.176	.211	.246	.282	.318	.353	.389	.425	.460	.496	.531	.567
K = .004	E				.015	.019	.023	.027	.031	.035	.039	.043	.047	.051	.055	.059
	D				.169	.204	.239	.273	.307	.342	.377	.411	.446	.480	.515	.550
K = .005	E						.017	.020	.023	.026	.029	.032	.035	.038	.041	.044
	D						.233	.267	.301	.335	.369	.403	.437	.471	.505	.539
K = .006	E							.015	.017	.020	.023	.025	.028	.030	.033	.036
	D							.262	.295	.329	.362	.396	.429	.463	.496	.530

# Flame Hardening of Bed Ways

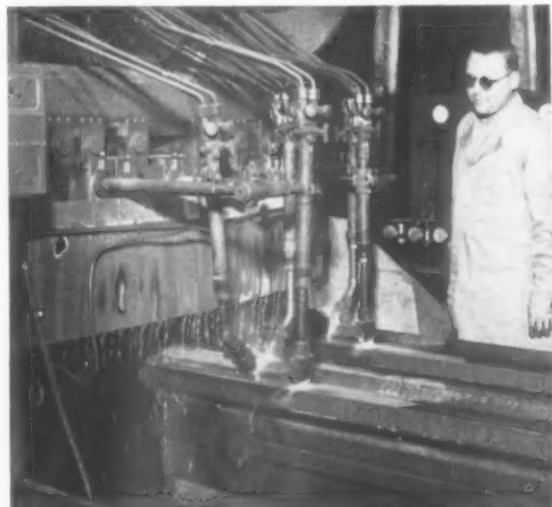
## Having Nonuniform Sections

UNIFORM FLAME hardening on the flat and V-ways is obtained on the lathe bed illustrated by regulating the intensity of the flame and distance from the work surfaces. This compensates for the differences in section as the lathe bed travels through the machine at a constant speed. In this special machine developed by Monarch Machine Tool Co., six torch stations are employed, two for each V-way and one for each flat.

Torch design is simple, each station being a single head with water jets immediately behind the flame zone. The water not only cools the torch tips but also quenches the heated ways as the bed passes under the stationary units. A water curtain behind the torches removes remaining heat to prevent it from transferring into the bed.

In this specially designed oxyacetylene machine for hardening beds up to 30 feet in length, the workpiece is positioned on two independent dollies. These dollies operate on rails and are driven by a motor-driven screw to feed the work under the

**Flat and V surface of lathe bed are hardened simultaneously by using a six-torch station.**



**A lathe bed is pulled under the multiple torch assembly by a motor-driven screw.**

torch heads at a predetermined speed. In addition to controlling the size of the flame and the distance from the surface, water pressure in the jets is carefully regulated to produce uniform quenching.

High-strength alloy cast iron, employed for the lathe beds, has good characteristics when flame hardened. Because of the speed of flame hardening, the heating time is short, producing a gradual blend of a martensitic hardened layer into the tough under body of fine pearlitic iron. The graphitic carbon normally found in pearlitic iron is retained, providing a multitude of microscopic reservoirs for retention of surface lubricants when the bed is placed in service.

Because of the speed of hardening, distortion is kept to a minimum and the hardened way surfaces require only a finish grinding operation. Investigation with a Shore Scleroscope shows an average hardness of 70 to 80 for the ways. Average depth of the hardened section is  $\frac{1}{8}$  inch.



Fig. 1. A welded tubular or angle-iron base can be incorporated in the plaster when a permanent model is required.

THE USUAL METHOD employed in the aircraft, automobile, and shipbuilding industries for producing three-dimensional plaster shapes, such as mockups, foundry patterns, Kellermatic models, and master tooling for contoured sheet metal products, involves the transfer of lines from lofts or flat layouts to contour templets. The contour templet must be accurately set up and rigidly held in position on a suitable base before the plaster model itself can be built. The resulting frame-like structure, or box templet, becomes an integral part of the finished plaster model.

In addition to labor and material costs involved in this method, there is also the problem of the extensive time spans consumed in scaling layouts, transferring dimensions to templet material and preparing templets for the plaster men. Another problem is the element of error in transferring dimensions by measurement or the discrepancies entailed when the photographic method is used to transfer layout lines to the templet material. Recently a method has been developed that eliminates the operations of transferring data from flat layouts to templets, cutting and filing these templets to accurate contour, and then setting them up in a frame.

In practice, this new method substantially reduces total labor costs and time spans between the loft and the completed master model, Fig. 1, and insures accuracy by a single direct transfer of dimensions, physically and not by mensuration. This

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## Contour for Sheet

method involves the use of equipment such as shown in Fig. 2, which consists essentially of four large cast iron rails having accurately machined top surfaces. These four beams are arranged in the form of a rectangle and, in effect, provide a large surface plate with a central open space. The developer base is equipped with leveling screws for the purpose of transit leveling to a surface variation of less than 0.005 inch in a distance of 12 feet. The beams are located around a pit so that the frames with contour points can be suspended from the sides of the equipment in the manner shown.



Fig. 2. Contour developing machine. The first station of fixed points is placed in the base at the exact location and locked into position.



# Developer

## Metal Products

By Lew W. Goodwin\*

Western Industrial Associates  
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The sides and edges of the surface plate beams are calibrated to provide for setting the point-frame assemblies accurately in reference to station or other lines.

In the development of a plaster model, point frames, with the points set according to the changing contour of the plaster model to be produced, are spaced along the surface-plate beams, giving a picture of the changing cross-section required in the plaster model. A typical setup is shown in Fig. 3 to facilitate alignment of the proper reference 3 of the equipment.

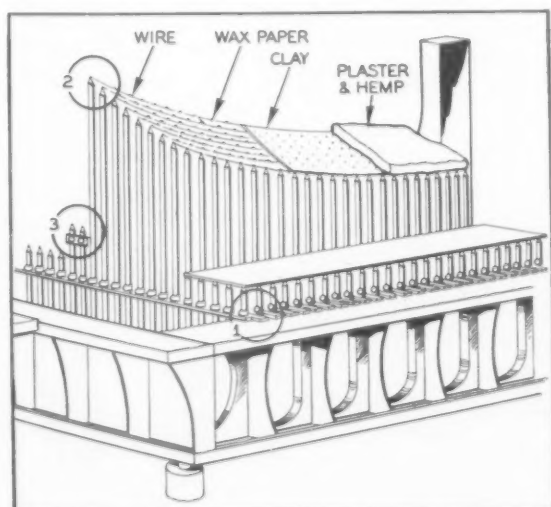


Fig. 3. This machine can handle models up to 107 inches long, 48 inches wide, with a maximum half-breadth of 32 inches.

This equipment, known as the Contour Developer, was invented and developed by the Contour Co. of Los Angeles. With its use, the need for templets is eliminated and a single transfer of loft data suffices to produce a complete shape or, if required, both left-and right-hand shapes, which can be duplicated as many times as required. Larger plaster models can be produced in convenient sections and then directly mated to form a complete model. This sectional modeling provides another advantage, in that any errors due to improper loft information can be corrected by altering one section only and not the whole model, as is necessary when using templet models. In prototype aircraft construction and other instances where only one finished part is required, mockups need not be built, since foundry patterns can be taken directly from the Contour Developer.

A setup table is used in conjunction with this equipment for locating the points in accordance with lofted contour lines; the point frames are also located with reference to the surfaces at opposite ends of the base frame which seat on the top of the surface-plate beams. A rack is provided for storing the point assembly frames when not in use.

The first step in the development of a master model is to set up the required number of point frames with the pointed ends so positioned in relation to each other as to give an outline of the desired contour at various points along the surface-plate beams. First, of course, each point frame must be set up. This is accomplished by using a penciled, metal-scribed, or photoreproduced contour layout, which is placed on the setup table between stops.

An aluminum straightedge is held against the

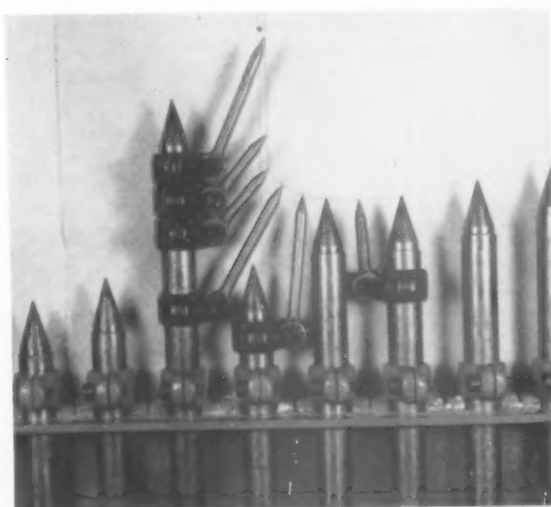


Fig. 4. Where a rapid change in contour is encountered or when there are vertical contours, one or more auxiliary points are used.



Fig. 5. Close-up of setting points to a loft board station line with allowance pad for skin thickness.

stops to facilitate alignment of the proper reference or base line on the layout with the stops. The layout is then clamped in position. Next, the point frame assembly is clamped to the stops and its base reference number is automatically aligned with the selected line on the layout.

### Auxiliary Points

The conical ends of the point tubes are now located vertically in line with the loft contour lines on the layout, Fig. 4. Small angle plates of the type seen in Fig. 5 are used for this purpose. A frame is set up for each different contour line of the required plaster model. The point tubes, spaced on  $2\frac{1}{2}$ -inch centers in the frame, are locked in place by means of socket-head cap screws. When a rapid change in contour is encountered or when there are vertical contours, one or more auxiliary points can be located and locked on the point tubes. One point tube in Fig. 4 has four auxiliary points mounted on it.

Both the point tubes and auxiliary points may be located the required distances from either the inside or the outside of lofted contours by using shims with the angle plate to allow for part thickness. Thus a plaster model can be readily made for either the inside or outside surface of a sheet-metal

part, regardless of which surface is drawn on the layout.

Stabilizer clamps, such as those in Fig. 6, are used to brace point tubes that extend considerably above the frame. When a frame is ready to be placed in the base, the points have been accurately located to give the required contour, and a transverse indexing member of the point frame is in the plane of a selected grid line of the layout. No dimensional measurements have been necessary.

A small electric hoist on an overhead rail is convenient for transferring the point frames from the setup table to the base. There, each point frame is located at a station by means of calibration on the surface-plate beams as shown in Fig. 7. The point frame is clamped to the surface-plate beams.

When all the frames have been set up and located on the Contour Developer, a top surface on the ends of the frames registers with a selected reference line on the beams and all frames are held to one inner edge of the beams. Therefore, all points on the complete set of frames establish the basis for an accurate three-dimensional contour surface. A good plaster man having a working knowledge of loft layouts is capable of handling all steps so far discussed, as well as those which follow.

In preparing the contour points for application of the plaster, the first step is to place washers over the tips of the points and then lay strips of wire screen over the points and washers. This provides a uniform support for a layer of modeling clay. The clay is next spread over the entire contour surface described by the points and screen, and roughly scraped, Fig. 8. The points are allowed to protrude slightly above the clay.

A layer, or splash coat, of Hydrocal or plaster is next spread over the entire clay bed to a thickness of approximately  $\frac{3}{8}$  inch, and allowed to set. The plaster is built up progressively with hemp and plaster in the usual manner to a thickness of about two inches, as seen in Fig. 9. The  $\frac{3}{8}$ -inch layer of plaster provides a surface that can be easily faired

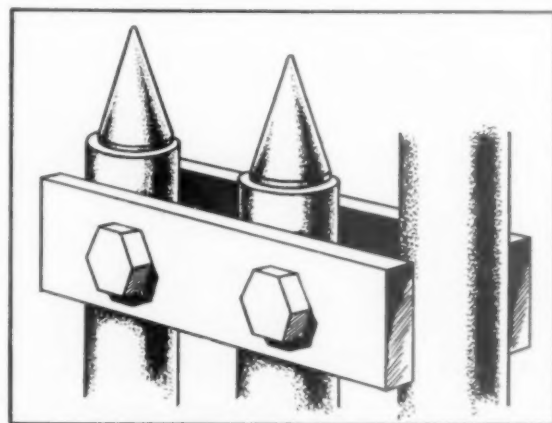


Fig. 6. Typical stabilizer clamp.

a later operation.

When a permanent master model or a model with permanent steel base is required, a welded tubular steel or angle-iron base can be mounted over the plaster form and incorporated in the model. This base can also be located from a grid line on the surface-plate beams by using height blocks, large angle-plates, and straight edges. The base members are made integral with the plaster form, as seen in Fig. 1, and are embedded in hemp and plaster in accordance with standard practice. When cast plaster patterns are being made for die blocks or similar parts, a dike box may be used to facilitate making the plaster model.

The conical indentations left by the contour point tips in the plaster surface are inked in with black shellac. The resulting pattern of black depressions against a white surface aids in scraping the model rapidly and accurately to the required contour. Scraping is performed until only the apex of each original conical depression remains as a small black dot with a radius of about  $1/32$  inch. These dots then provide visible reference points for use as a guide in the fairing step.

With some plaster models, it is advantageous to provide templets for use as gages in sweeping in and checking contours that are of a constant cross-section, such as male or female reinforcing beads or fillets. When scraping and fairing have been completed, station and trim lines are scribed on the plaster form. The final step in the production of the plaster model is the application of clear shellac.

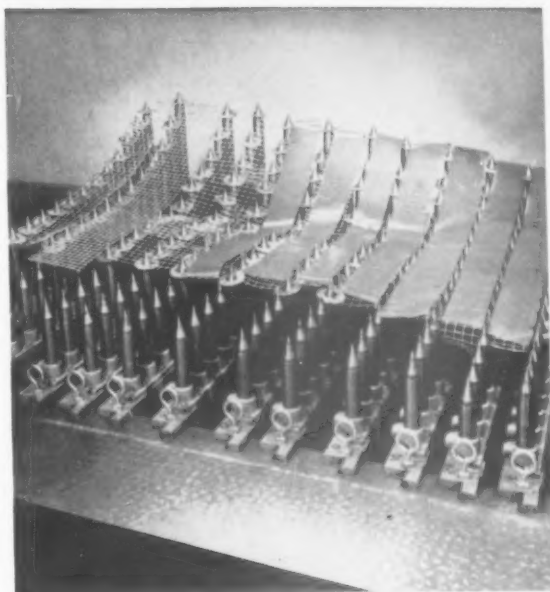
The Contour Developer is of sufficient size to provide for making plaster models up to 4 x 9 feet in one section. Any size of mockup can be built by bolting a number of small sections together, in which case the attaching points can be accurately established and coordinated. For example, a mockup for an experimental automobile body was assembled from six conveniently made sections. No templets were used in making this mockup.

An air scoop model symmetrical about the center line is built in two halves with only one point setting. The opposite half was made by merely reversing the point frame end-for-end in the developer base, forming the model and then mating the two halves. Any possibility of dissimilarity was forestalled in producing the opposite hand, since it was an exact duplicate of the first and not subject to human error in templet filing.

**Fig. 7.** Twelve stations of point assemblies set in master base, showing washers, wire mesh, and oil paper backing. Note scale graduations for locating point assembly frames to proper stations on master base.

**Fig. 8.** Modeling clay matrix being roughly faired into point assembly. The points are not sharp, but have a 0.250 radius.

**Fig. 9.** Plaster poured to clay matrix, with loops to which the base is secured.



# Atomic Gun—



## A Masterpiece of Production

**N**EWEST STRATEGIC WEAPON, the Army's 280-mm mobile gun, was demonstrated formally at Aberdeen Proving Grounds on October 15. This formidable gun is capable of firing both atomic and conventional projectiles, is accurate at long range and can be set up for action within fifteen minutes.

In transit the gun and its mount, supported by gooseneck brackets from two 4-wheel tractors, is capable of traveling about 35 miles per hour. It can be emplaced and placed in action faster than any other heavy field artillery piece. The entire carriage is balanced on a turntable equipped with a large steel ball that fits a socket in the carriage, plus three jacks with wheels which ride on a track around the turntable. When jacked up in the rear, the carriage can be rotated horizontally through a complete circle. A gear train traverses the weapon through a smaller arc when the rear pad is in place. A double recoil mechanism, one on the barrel and one on the mount, makes possible the use of the small turntable mounting.

Prototype of the new gun was made at Watertown Arsenal. Assembly-line production models are built by Dravo Corp. From the time the formal contract was awarded Dravo, only ten months elapsed until the first unit was shipped. Processing of prints

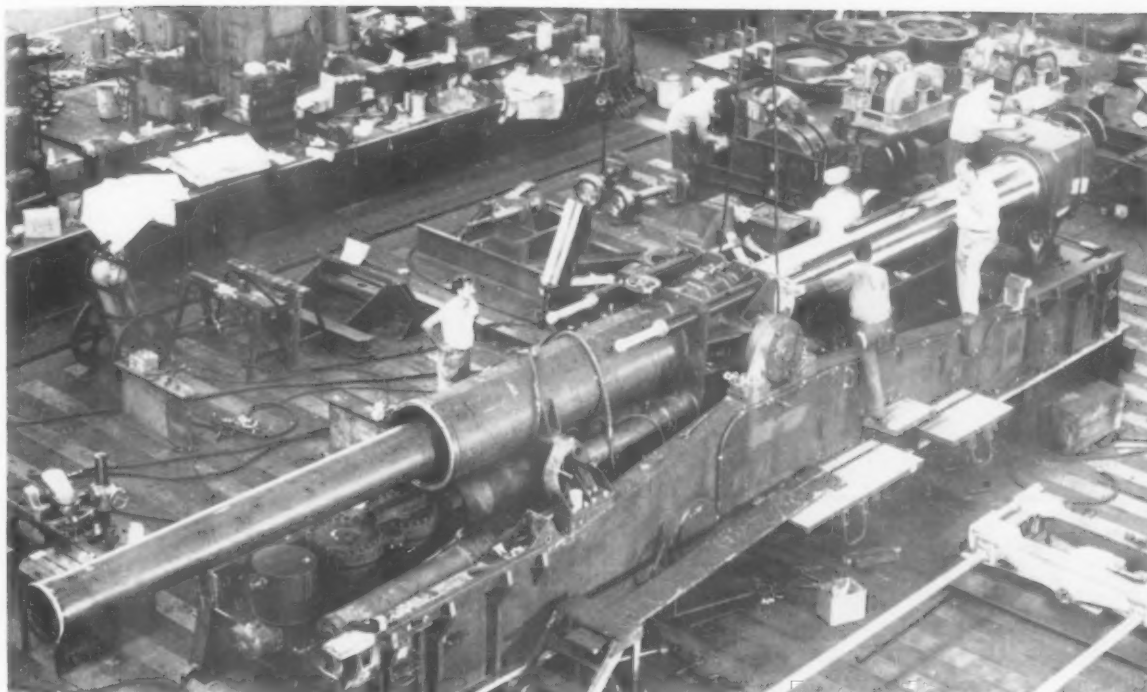
and shop orders for welding operations and assembly, analyzing each assembly and subassembly for operational sequences, and setting up a materials procurement program were a few of the production problems.

Largest weldment in the assembly is the top carriage 38½ feet long, being two double-web girders joined by transverse steel frames. Stainless steel flanges are fixed to the bottom of these girders. Steel castings are welded inside for bearings and gears. To assemble the top carriage it was necessary first to fabricate subassemblies of component parts. Tolerances allowed for the subassemblies are 1/32 inch to provide close fitting.

Side girders of the carriage are built in special jigs. Transverse members are installed to join them. In the final welding stages of this assembly, the carriage is rotated eleven different times to permit welding according to a procedure designed to lessen distortion. All steel castings in the top carriage are preheated before welding.

First machining operation on the carriage is the stainless steel slides, performed on a 26-foot planer. One-half the slides are machined at a time. Then the fixture with the carriage on it is rotated for machining the second half.





Nearly 2200 separate drawings govern the assembly of the 280-mm gun.

Supported on the carriage with trunnions, the cradle tube assembly is a heavy alloy steel casting with stiffeners and trunnions of the same material. For welding operations it is preheated and maintained at 700 deg F. Critical operation on the cradle is the alignment of the two trunnions with a keyway that receives the gun barrel key. To cut the slot, 3 inches wide and 8 feet long, with the tube a planer is used. Progressively wider cutting tools, attached to a bar connected to the planer head, are employed to cut the keyway.

To keep the gun within weight limits, which are critical because of the transportation problems involved, and at the same time capable of withstanding the forces of firing, many special designs and materials were employed. Specified were various types of

high-tensile, carbon, alloy and stainless steels, bronze and brass, as well as light-weight aluminum and magnesium.

Most of the welding is performed in the down-hand position to assure strong and smooth welds. Approximately 3200 feet of welding is required for the fabrication of one assembly and its component parts. Every weld is inspected, before and after stress relief, by either the Magnaflex or dye-penetration process.

Use of special jigs and fixtures enabled faster production and assured that the work would be completed within the specifications and tolerances. They also permitted utilization of available machine tools without the delay required to build special equipment.

Transported by special trucks, the mobile 280-mm gun is not much larger than the heaviest field artillery now in service. Setup time is less than 15 minutes.



# Butt Welding

## Thin Stainless Steel

**F**OR USE IN MODEL making a condenser discharge technique for spot-welding butt joints of very thin stainless steel has been developed by the Naval Ordnance Laboratory. The construction problem was one of making butt welds with stainless steel varying in thickness from 0.005 to 0.025 inch. Investigation showed this could be accomplished if intense heat is applied for a very short interval (between 0.001 and 0.010 second) and the material to be welded is supported in a special jig. T and I-beams with flanges 0.135 inch wide and 0.0083 inch thick whose webs are 0.25 inch wide and 0.0077 inch thick have been fabricated successfully by this method.

To achieve these results, it was found that a condenser discharge welding technique was necessary. In this process, electrical energy is stored in a bank of capacitors and discharged through transformers into the weld. Special jigs, made to a tolerance of 0.001 inch, are used to hold the material during the welding process and are attached to milling machines for automatic operation.

To produce neatly and strongly welded T and I-beams, several conditions have to be maintained. In the first place the voltage to which the condenser is charged must be controlled to within three percent to obtain a satisfactory weld. Furthermore, the pressure applied must be maintained closely with the weld being initiated shortly before maximum pressure is applied. The size of the electrode must also be closely controlled. If it is too large, no weld results, and if too small, the concentration of heat is too great and the material burns.

Burning of the flanges was one of the more serious problems until an alcohol immersion technique was improvised. The relatively large difference in area between the flange and web results in the web burning or sputtering away before the

flange can be brought to welding temperature. By bathing the material in alcohol during welding, there was a noticeable improvement, which was believed due to several factors. Burning is minimized by rapid cooling by evaporation immediately after the weld takes place. In addition the coating action of the alcohol reduces oxidation and keeps electrode contamination at a minimum. This is an important factor since the fabrication of the I-beam in 10-inch lengths calls for 240 individual welds which are made in two automatic processes, each of which requires about five minutes.

The finished products can be made in any desired lengths and under certain conditions, can be bent into any desired shape without breaking the weld.

**Fig. 1. Special jig and electrode for spot-welding thin strips of stainless steel. The operator at the right is placing another strip in the jig attached to a milling machine.**



# Foreign Machine Tool Shows

By Joseph P. Crosby

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The Lapointe Machine Tool Co.  
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AT THE MACHINE TOOL Exposition at Olympia Hall, London, England, the tremendous number of machine tools exhibited in one exhibition hall was impressive. The show itself was larger than the National Machine Tool Builders Show in Chicago in 1947, and as far as space was concerned, was even more extensive than the ASTE Show in Chicago this past winter.

In general, there was nothing on exhibition which has not been previously known or seen in this country. There were some American machine tools at the exposition, and although not as streamlined in design as the English machines, they were performing equally as well as any English machine tool. The appearance of all foreign machines exhibited at Olympia was of high caliber.

The development of the jet engine, with its special requirements, is exercising a notable influence on machine tool design. The special problems found in machining rotors, casings, and other components have definitely affected the machine tool industry.

At the Olympia Exhibition there were several types of T-lathes in which the spindle is at right angles to the edge for machining large diameters. There were approximately 15 exhibitors showing tracer lathes, and it appeared that all of these were about equal to American machines in appearance, rigidity and automatic attachments.

Twenty-seven builders were showing copy millers. The spindle speeds were comparable to those in machines built in the U. S. The standard milling

machines, however, did not appear to measure up to American standards for rigidity.

The Exhibition at Hanover, West Germany, impressed the observer more by its size rather than by any outstanding features of the machines. The space at Hanover was three times as large as that at Olympia, and even this area appeared inadequate, for one exhibitor was showing a turret lathe in a glass-enclosed truck on the outskirts of the exhibition grounds, and another lathe was exhibited in an alley at the rear of one of the hotels in the center of Hanover.

The extent of the rejuvenation of the German machine tool industry in four or five years is difficult to realize. A typical example is a manufacturer of large, heavy machine tools used in rolling mills. Before the war he had owned three substantial ma-

chine tool plants, which were totally destroyed during the war. The head of the company was jailed in 1948 as a war instigator. On being released from prison, with his factories destroyed and with limited resources, he was able to re-establish one of his factories and at present is well on the way to opening the second. At present he employs 1200 workers, and an estimate of the machines he had on exhibition amounts to over a million dollars.

One machine at the show, an electric drive planer, 10 x 10 x 36 ft, was as rigidly built as any machine this observer has ever seen. It was demonstrating a large cut on a piece of stainless steel. To show

During a recent trip abroad, Mr. Crosby, who is second vice president of the Society, represented ASTE at the National Machine Tool Exhibition, London, England. He also visited the Second European Machine Tool Exhibition at Hanover, Germany. This report presents his impressions of the shows and the status of the machine tool industry in Europe, as well as a comparison of American and foreign machines.

the rigidity of the machine, a coin was balanced on the crosshead during the cut. With a selling price of \$350,000, the machine was built and shipped to a firm in Tokyo, Japan. All machines at this company's exhibit were built for rolling mills.

A Swiss copy lathe by Fischer had an innovation in that the carriage ran vertical to allow the chips to fall into a pan. This might be attractive on some of the higher production jobs. There was also on display a lathe cutting lead screws with a fly cutter. The lead screw was cut to full depth in one pass. A total of 65 manufacturers of large engine lathes participated.

In general none of the machines exhibited seemed to be superior to those manufactured in the U.S. There were some outstanding presses, however. The standard machine tools did not appear to have the rigidity and power to stand up under the high production demands in this country.

There are some factors which should give confidence to the domestic builder. A British automotive manufacturer said that if it were possible to obtain the necessary dollars he would always buy American machine tools in preference to those manufactured in England and on the Continent. The reason for this statement was the fact that American-built machine tools had only one-tenth of the down time of other machine tools. This one item alone would pay for a price differential between American and foreign-built machine tools.

Deliveries in England average five to six years for machine tools. In Germany, the delivery period

is from one to six months, depending on the size of the machine.

One factor which does not favor the American builder is the wage scale. The average wage scale for a mechanic in England is 75 cents an hour, while it is only about 40 cents an hour in Germany. This is definitely tough competition and the American manufacturer will undoubtedly feel it within a year or so, where the foreign market is concerned.

Factories in England are on a one-shift basis because of the man-power shortage. This factor makes it almost impossible for a new manufacturer to establish a factory. One American company which applied for a permit to build a new plant was told that the only site was in northern Ireland where labor might be available.

Orders for the more expensive automobiles have recently been falling off. Rather than build cars for sale in England, the manufacturers have reduced the workweek to three or four days. There is a tremendous desire for new cars among the English people, and the waiting period for delivery is from five to six years. It is rather difficult to understand the economy that forces a reduction in work hours when the demand for cars is so high.

Both in England and on the Continent, the manufacturers are very confident concerning the future of the machine tool business. They realize that the American builders are absorbed with orders from the domestic market, and they are therefore making a concerted drive for the machine tool business in all the other markets of the world.

## Inserts Protect Threads Tapped in Soft Metals

**T**HREAD WEAR and stripping has been a headache for those who have had to tap threads directly in soft metal parts. Now much of this problem has been solved by the adaptation of stainless-steel wire thread inserts. When installed in such soft materials as copper, aluminum or magnesium, these inserts provide threads having higher loading strengths and greater resistance to wear and corrosion than unprotected threads tapped in the same materials.

The manner in which the problem has been overcome may be clarified by studying an example at Tocco Div. of the Ohio Crankshaft Co. where an induction heating unit is involved.

Every tapped hole of the copper plates serving as transformer outlets for the heater contains  $\frac{3}{8}$ -16 stainless-steel wire inserts furnished by Heli-Coil Corp. Each set of outlet plates projecting through the ebony-asbestos transformer panel has 12 to 16 protected cap-screw holes. Induction blocks, formed of square copper tubing, are secured directly to the transformer outlet plates to make the live connections for each induction unit. These blocks must

be removed frequently and replaced with induction blocks of varying size and shape, depending on the size and shape of the part to be treated.

Before helical wire thread inserts were specified as an integral part of the induction heating unit, high installation torque on cap screws stripped the unprotected copper threads in these plates. Even when extreme care was taken, the copper threads showed excessive wear because of the frequency with which the inductor blocks were interchanged. However, with the installation of insert-protected threads, there is assurance of thread permanence.

Success in the transformer outlet case led to study for uses in other fields. It was found that copper bus bars can be fastened more securely when their tapped threads are protected in this manner. The stainless-steel wire thread inserts provide a substantially higher thread-flank contact and at the same time permit greater installation torque to be applied to connecting cap screws. Yet another application, still in the experimental stage, is the protection of threads in insulating materials.



# How to Increase Press Brake Efficiency

**By Harry M. Smithgall**

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The Budd Co.  
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**F**OR A PLANT TO EMPLOY its press brake equipment to the best advantage, it is necessary that a certain amount of information be recorded and available for reference. A chart should list all brakes according to the manufacturer, serial number and code number. It should also include tonnage, length of bed and ram, type and thickness of bolster, shut height, stroke adjustment, stroke, strokes per minute, distance between housings and throat clearance.

In addition to this primary information, the number and horsepower of motors, weight, present location, and spare parts carried for each type of equipment should be listed. A third category should provide a maintenance record. With all of the foregoing information provided, it will not be difficult to set up operations correctly for the press brake.

If the brake is mechanical, tonnage near the bottom of the stroke is the important factor. The available tonnage in any crank-operated press varies with the position of the crankshaft or eccentric. Most hydraulic press brakes will deliver constant tonnage at any point in the stroke. Every manufacturer of press brakes will furnish a chart of useful engineering data or tonnage required for bending. This will serve as a guide in determining the load that can be placed on the equipment. Charts are also available for blanking and piercing.

Hot and cold forgings are variables and must be treated with extreme care. When work of this nature is to be performed, every effort should be

made to safe-guard equipment against overload. Much damage to equipment can be caused in cold forging, coining or flattening since the yield and tensile strengths of the metals increase rapidly under cold work. Overload safeguards are available in the form of electrical clutch knockouts and Pittman overload devices.

The variety of work that can be done on press brakes and the availability of ram adjustment, which is continuously in use, opens up possibilities of damage to this type of press from incorrect die settings. Even the skilled operator sometimes will come down too hard on the dies, set the ram adjustments too close, improperly balance the load or attempt to form parts requiring tonnage in excess of the capacity for which the machine was built. These improper uses may cause serious damage to unprotected presses such as sticking the press on bottom center, bent screws, stripped threads, broken ball joints, broken slides or twisted cranks; sometimes, although damage is not immediately apparent, the machine is sprung out of line.

Repairing the damage to a press that has been severely overloaded can be expensive, and presses that have been repaired rarely run as well as when new. Operating a press brake that has had the housings distorted places a heavy handicap on good workmanship in the product.

The length of the bed plate and ram will control the length of the workpiece to be made economically. Longer pieces can be made by the so-called "biting in the bend" method. This operation

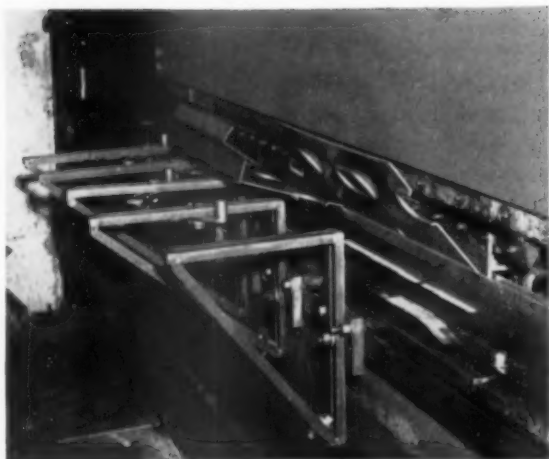


Fig. 1. Set up for a serial operation, this machine performs several operations on the same piece before it is removed.

involves making a 90-degree bend in three or more hits or progressively bringing in the bend from one end to the other. This is expensive in that extra handling and hits add to the cost of the product.

Ram length will also control the number of operations that can be run at the same time. New economies have been realized in serial operations whereby a piece is blanked in one die and then moved to other dies for notching and forming, passing through a series of processes without ever being put down and picked up again or going to another machine, *Fig. 1*. The advantage of this type of production is becoming increasingly evident. It is not uncommon to see three or four men working on one press brake, each doing a separate operation.

The shut height and the thickness of the bolster are closely related to each other. It is essential that a bolster be used for run of the mill bending, thus permitting the punch and die to be centered or lined up properly. The thickness is important in that it controls the shut height and affects tooling. Camber design has been machined into bolsters on press brakes, so that when fully loaded, the bed plate deflects; the result is a straight line. Bolsters may now be purchased with adjustable camber. Both the ram and the bed may be built with extensions on one or both ends or they may be made wider to accommodate punching, blanking, corrugating or forming dies. The tonnage of the press brake is calculated in such a manner as to have the work set up equally between the housings, and centered front and rear. Any deviation from this procedure must necessarily require lighter hits and the equipment engineer should be consulted.

There is very little allowance on the ram of any brake for remachining. This is due to the

fact that the edges of the clamping bolt holes are close to the surface of the tongue seat. If machining should be necessary, all gouges or deep nicks must first be welded to insure minimum metal removal. There is only about 0.060 inch allowance, so precision is essential. Fillers, the thickness of the tongue of the punches, should be clamped in the ram to permit machining of a straight bearing surface. The manufacturer has machined about 0.001 inch camber per foot of length of the bolster. Any rework on the bolster should maintain this camber. This is accomplished by placing shims of the correct thickness under each end and clamping down of the sag in the center when the work is set up on a planer for machining.

The shut height of the press brake is the distance between the bottom of the ram and top of the bed plate when the stroke is down and the adjustment is up. When a bolster is added on the bed plate, it is reduced, and when the adjustment of the ram is brought down, it is still further reduced. There is usually a five or six-inch adjustment of the ram. On newer press brakes a ram lock is provided. This is a device that maintains the adjustment of the ram and prevents it from inching up or down with each hit.

#### Press Brake Controls

The stroke of the press brake will vary from about three inches to about six inches; usually, the smaller presses have the shorter stroke. The press brake varies consistently from other types of presses in that the amount of movement of the ram is controlled by the operator's foot pedal, which permits stopping at any point in the stroke. Special electrical controls are designed for a combination of continuous operation with safety control buttons—single-cycle and stop, or inching to any position.

The strokes per minute will in many ways control the production efficiency, for they may vary from 7 to 80 strokes. Here again, the small press brakes are generally faster, though many of the newer models have two speeds and can be changed over quickly.

The distance between housings and the throat clearance are closely related. The throat clearance determines the maximum flange that can be turned on a die the length of the ram, while the distance between housings determines the maximum length of sheet that can be bent with a flange in excess of the throat clearance. Naturally, this is never as much as the length of the bed plate or ram. This is information that must be available to the product designer.

The remaining questions are of lesser importance

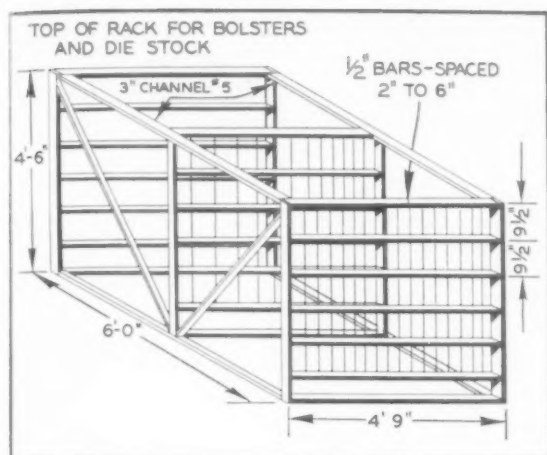


Fig. 2. An efficient die storage rack will utilize floor space to the fullest extent and will prevent damage to the dies.

and can be answered briefly. Data on motors are desirable from the replacement and exchange standpoint. The weight assists the millwrights and riggers in moving equipment. Present location is merely standard practice. Spare parts, such as Pittman screws and nuts, clutch plates and brake parts, motor belts, etc., are all necessary in quantities that vary with the number of pieces of equipment that have interchangeable parts. Maintenance records are always interesting to study. Low maintenance costs usually reveal high production standards. The keynote to low maintenance

cost is a plan for preventative maintenance. Performance records should be compiled around each piece of equipment that is producing a stabilized product and a stroke efficiency established. This should also be established for various classes of job shop work. These figures become particularly valuable when production must be increased and new personnel added to the shop force. Again, with increased production, increase in the number of spare parts becomes a factor for consideration, as well as shortening of the maintenance cycle. A continuous study of ways and means of increasing the efficiency of each piece of equipment will prove invaluable when increased production schedules must be met. It is also desirable from a cost analysis basis.

There are a few other items that can be classified as equipment to be considered. First, there are die racks to be built to accommodate various sizes and shapes of dies, and at the same time utilize floor space efficiently as shown in Fig. 2. The dies should be stored in an upright position so that no damage to the bearing surfaces will be incurred during handling. A reliable belt type of sling together with quick-operating hoists are essential for rapid changeover and setup. Also required is a die checking fixture that will permit setting up the dies and holding them in the same manner that they are held in the press brake, so that all the bearing surfaces can be indicated. This fixture will soon pay for itself in the quality of the work produced.

## Europeans Speed Up in Electrical Field

AMERICAN MANUFACTURERS of electrical cable may find that European companies will be doling out some stiff competition as soon as their own defense needs are satisfied.

R. A. Schatzel, vice-president and director of engineering of the Rome Cable Corp. recently returned from an extensive trip abroad where he analyzed the field through his contact with nine plants in France, Switzerland, Germany, Italy and England. His conclusion was that the factories, especially those in France, which have been rebuilt and modernized through ECA and MSA aid from the United States, have made tremendous strides and they are using production methods as modern as those in this country. One French firm has turned out a special 380,000-volt cable order which is the highest voltage cable in the world.

According to Mr. Schatzel, American wire drawing machines of the latest design were installed in two factories, yet their own equipment, made in that

country, is fully equal to anything produced in the United States.

Competition with this country will probably come as soon as the defense needs are filled and the manufacturers seek new markets in order to keep their factories running. Those undoubtedly will mean South America where U. S. cable manufacturers have been building up a market since the war.

Our single advantage, in the eyes of Mr. Schatzel, seems to be efficiency. However, French plants are improving consistently. At the same time, the fact that French labor cost is about one-third that in this country lessens the handicap of lack of efficiency.

Concerning material, use of aluminum in electric wire and cable in Europe is slight, since copper has been in better supply in Europe than it has been here. However, a number of manufacturers are experimenting with aluminum—and there are some excellently equipped laboratories in Europe and technology is good.

# Vacuum Testing

## on Production Lines

By **Lorance E. Sterns**

Chief Engineer

Whittington Pump and Engineering Corp.  
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**V**ACUUM TESTING, being a simple method for production testing, requires very few major parts for the system. The primary elements required are a vacuum pump, valves, gages and a seal pad. In the system illustrated in *Fig. 1*, vacuum is produced by a water-jet pump which has only one moving part. Since there is only one moving part and the work medium producing the vacuum is water, there is no deterioration in the vacuum producing capacity as the unit ages.

The sealing device is arranged so that the cavity of the part can be closed and a vacuum drawn upon the cavity therein. The gage is connected into the system in such a manner that closure of the vacuum valve will isolate the part and gage in a closed system. Leak of atmosphere into the vacuum in the cavity of the part will cause a reduction of the gage reading.

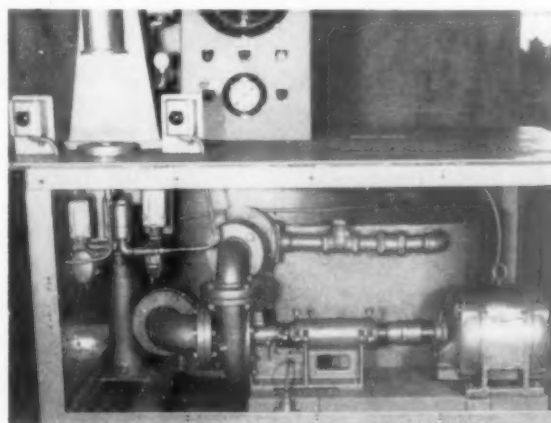
Filters must be installed in the system to prevent dust, dirt and chips from entering. The filter has been designed specifically for testing machine use and has a direct opening from the part to the filter bowl. Special piping and fittings are required in the vacuum system since small leaks can spoil the effectiveness of a test. Special flanged connectors are used on copper piping so that an O-ring is the sealing member between the flanges. With this type of flanged hookup, it is possible to remove piping from the system and make repairs with little chance of developing a leak in the system after the repairs are completed.

The external pressure applied to a part from atmosphere which is on vacuum test usually amounts to 12½ to 13 psi when the vacuum within the part is 25 to 27 inches of mercury. The natural inclination is to assume that flow from atmosphere to vacuum is based upon the pressure differential between the two areas. However, flow from atmosphere through an orifice into a vacuum is somewhat greater than anticipated in many cases. Actually,

the critical factor is what the leak does to the partial atmosphere within the cavity.

When a cavity is evacuated to a moderately high vacuum, the air within the cavity is expanded until it is quite rarefied. In other words, there is very little air remaining in the cavity. In fact, at 25 inches, a portion of the original air within the cavity has been expanded to six times its original volume. It is understandable that, should a part have a leak in it, atmosphere entering the cavity will cause considerable difference in the ratio of expansion within the cavity. A leak from atmosphere into a cavity in which there is a vacuum tends to work on a sort of vernier principle which increases the range of indication considerably as compared to leaks out of a chamber under compression.

Indication of change in pressure within a cavity in which there is a vacuum is sometimes measured by a mercury manometer. However, the mercury manometer is not satisfactory for vacuum test applications because of the time required for the



**Fig. 1.** The vacuum tester is a compact piece of equipment. Shown here is the valving, vacuum pump and motor. Above the table can be seen part of the instrumentation.



mercury to settle after the pressure changes occur. Another difficulty with the mercury manometer is the fact that the pressure indication is not sensitive. In other words, an indication change of 1/10 inch of mercury is not very discernible to the operator and as a result considerable time on test is required to secure a distinct reading.

A special vacuum gage in which the range of indication on the gage is blocked for the lower vacuum range has been developed for the vacuum tester. The gage is arranged so that the indicator makes a 360-degree revolution for the last 10 inches of vacuum (20 to 30 inches Hg). Thus on a 12-inch gage, the tip of the indicating hand moves approximately 31 inches for a 10-inch differential in pressure. When this gage is applied to a part on test, a leak causing a change in pressure within the cavity of a part at the rate of 1/8-inch mercury change will show on the 12-inch sensitive gage a hand movement of 3/8 inch. With this amplified indication and proper periods for the time of test, very sensitive leak indication is possible.

Vacuum testing on small parts which have a cavity of 2 to 3 cubic inches is rapid. Such parts can be tested at the rate of 4 to 12 per minute. Often it is possible through multiple test stations for one operator to operate two, or even three, test stations and achieve production rates from 100 to 1,000 per hour. On larger parts having a volume of approximately 10 to 20 cubic inches, good tests are possible within a time of 10 to 20 seconds per piece. Thus on medium-sized parts, it is possible to attain production rates from about 100 to approximately 360 pieces per hour.

Larger volume parts having more than 20 cubic inches or as much as 1 cubic foot require longer periods to provide sufficient time for evacuating the part. Actually the rate of production on vacuum testing is not a critical factor from the design standpoint because fixtures and control equipment can be arranged to take care of practically any requirement presented. Use of multiple test stations, automatic equipment of various designs and effective fixtures produce efficient testing operations.

Vacuum testing is used extensively in the automotive field for testing castings, sheet metal drawn parts, windshield wipers, vacuum retarders on ignition systems, cylinder blocks, cylinder heads, valve assemblies, cylinder sleeves, etc.

Tooling for vacuum testing is surprisingly simple. The tool engineer will find new concepts of tooling when designing for vacuum use. Vacuum tends to draw the sealing members to the workpiece and, once vacuum has begun to build up within the cavity of the part, it is usually impossible to remove the seals by hand unless they are quite small. In many cases, it is possible to lay a simple part on a rubber pad properly supported and draw a vacuum within the cavity of the part.

Parts which have openings in the walls of the cavity can have those openings sealed by hand-applied rubber pads. Where the number of openings makes it unhandy for the operator to apply the pads, mechanical methods of pad support are used. When the castings or parts to be tested are large and hard to handle or where the time consideration in the test operation is close, it is possible to close the openings with pads mounted on air cylinders. With this air cylinder method, it is possible to place the pads quickly and efficiently without operator manipulation. Sometimes it is necessary to use air cylinders when castings are tested to apply considerable initial pressure on the part to imbed stray machining chips on the sealing pad.

Some types of cavities are enclosed within a part and it is necessary to determine whether this part

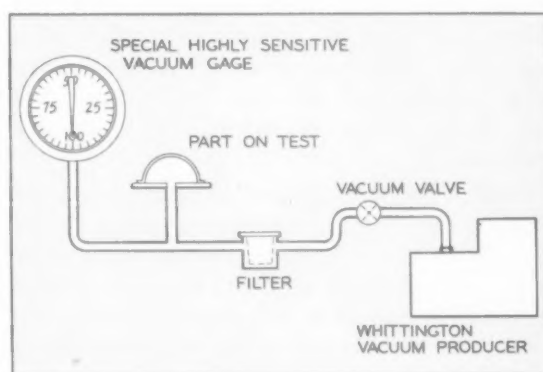


Fig. 2. Schematic diagram of a vacuum testing machine shows the essential parts of the system.

will leak or not. This is typical of a float. The float is a sealed cavity and cannot leak because the float operates in fluid and will "waterlog" in service should there be a slight leak in the seams or body of the float. Waterlogged floats, of course, soon lose their effectiveness and are a headache to the builder of equipment. It is possible to test this cavity by vacuum very simply. The part is placed within a chamber and a vacuum is drawn quickly in the area surrounding the part. Should the atmosphere within the part leak into the vacuum drawn around the part, then an indication will be shown on the gage. This is unusual in that production parts can be tested 100 percent without deformation of the part or other testing hazards.

For automatic controls or signals in vacuum testing, it is possible to use a photoelectric tube built into the gage in such a manner that the tube watches the gage hand to determine the leak tolerance on a certain part. With this type of indication, many circuit functions can be designed into a vacuum test machine to do functions necessary to the testing of a specific part. In fact, with photoelectric tubes it is possible to build an automatic

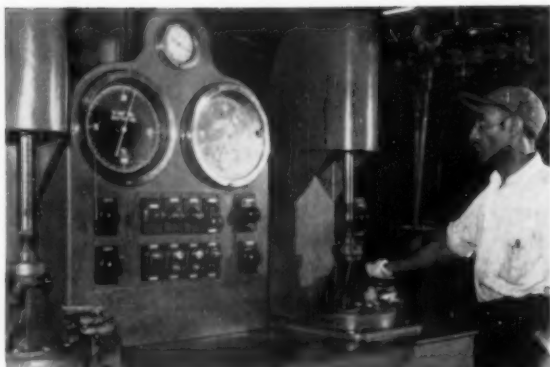


Fig. 3. Two castings are tested simultaneously in this machine. The two large dials indicate any leaks in the parts due to porosity or sand holes.

machine in which the operator places the part, starts the test cycle by means of a push button. At the end of the test period, a good or bad part will be indicated by lights on the panel of the instrument. In addition to automatic indication, automatic rejection and automatic pickup from conveyor lines can be incorporated within the test machines.

To illustrate an application of vacuum testing, a system for production checking differential carrier housings will be discussed. The carrier housing supports gears which must run in a high quality lubricant. Retention of this lubricant within the housing and the rear axle housing is critical in that loss of lubricant may result in failure of the gearing and bearings.

Fast, accurate testing of differential carrier housing castings in production was of paramount importance at one automotive plant where the housings were being machined. To accomplish this, two Whittington vacuum testing machines were placed in operation during the latter part of 1951.

The principal objective of the testing equipment was to determine whether the walls of the casting were sound from the standpoint of porosity, shrinkage cracks or other defects which might permit leakage of the lubricant from the casting during its use. The structure of this casting is such that the wall thickness varies considerably because of thick stock areas for machine pads and for strength consideration with thin wall areas between the critical surfaces. As in all castings, the transition area from thick sections to thin sections creates problems in casting. There is always shrinkage differential which, in many cases, may crack or at least strain the metal during the casting process and result in porous conditions which would not retain the lubricant.

Production rate on these castings is approximately 500 pieces per hour. In order to meet the production requirements, two vacuum test machines are required. Each machine is equipped with

two work stations and each station is capable of testing 125 pieces per hour. The two testing machines are installed on opposite sides of an overhead conveyor and arranged in such a manner that the operator of each machine may remove the parts from the conveyor, apply the test, and return them to the conveyor in a smooth, simple and fast operation.

Tooling on the vacuum testing machines is simple and efficient. The large flange of the casting is placed on a ring gasket so that brackets on the inside of the casting are extended into a potlike structure below the surface of the large flange. An air cylinder applies initial pressure to the small end or drive-shaft end of the casting so that the drive-shaft end and large flange end are effectively sealed for the initial vacuum application.

Vacuum is then applied to the part automatically and, when sufficient vacuum has been applied, the supply vacuum valve is closed, isolating the part on test and a gage in a closed system. Thus, a leak in the part will be indicated by a drop in the vacuum shown on the gage.

These machines are arranged with semiautomatic test cycles. The operator starts the test cycle by pressing two push buttons which initiates the complete test cycle. The operator observes the gage during the test. One operator loads and unloads the two stations on one machine without sacrifice of either quality of test or loss of production time.

Due to the fact that the drive shaft enters the casting offset to the center of the mounting flange of the casting, it is difficult to seal the casting for testing by other means. This offset condition is no handicap to vacuum testing. In fact, there is no problem since initial sealing is all that is desired. After the initial sealing, vacuum will pull the sealing pads to their respective surfaces and hold them there during the test period. The air cylinder method of sealing is convenient in that it applies the sealing pad quickly and applies sufficient pressure to the part so that, should there be any chips or foreign material at the sealing areas they would be depressed into the rubber pads. The air cylinder also eliminates the need for the operator to handle an additional part of the test equipment. A filler block is built into the pot in such a way that the space between the brackets for the differential is filled with solid material, permitting the reduction of volume within the part on test. As a result of the smaller volume on test, the indication is more accurate and rapid.

As changes and improvements are made on the castings, it may be necessary to modify the design of the fixtures. These machines are designed in such a manner that replacement of the fixtures or retooling is comparatively simple in the event of major changes in the part.

## Tooling for Toys

By **G. F. Schumacher**

Vice President and Works Manager  
The A. C. Gilbert Co.  
New Haven, Conn.

**T**OYS FOR BOYS has become big business, representing a sizeable share of the billion dollar annual toy market. Of these toys, the electric train is probably the most spectacular and is typical of this far-flung industry which embraces many large companies and countless smaller ones. The electric train, in fact, has become considerably more than a toy. It is a national hobby with devotees among adults as well as boys. This is attributable largely to the fact that more attention to detail and realism, *Fig. 1*, is devoted to the design and manufacture of these spectacular and imagination-stirring toys.

With more precise detail and scale size, more operating components, and more realistic effects built into today's trains, the increased appeal through realism has been reflected quickly through ever increasing markets. Except for minor details, electric trains now look and perform like the actual locomotives, coaches and cars they are designed to duplicate. Steam locomotives chug and puff smoke, mail cars load and unload bags realistically, passenger stations automatically stop the trains while realistic sound effects emanate from the station, and block systems with semaphores prevent collisions or provide automatic switching. All

these operations are controlled or set up from a central panel where the owner is the dispatcher in his miniature railroad empire.

Processes and methods normally utilized in producing consumer or capital goods are also employed in the manufacture of toy trains. Except for the products being made, the manufacturing plant and facilities are much like any industrial plant and include tool and die departments, automatic screw

machines, stamping presses, plastic molding and die casting presses, powder-metal presses and sintering furnaces, automatic electroplating lines, vacuum metalizing equipment, painting and finishing departments, conveyor assembly lines and testing and shipping departments. Processing and scheduling through all the various departments is much like that in any well-managed plant. Also, the management of such a plant is similar as indicated in the organizational chart in *Fig. 2*.

Some of the interesting phases of train manufacturing and the methods employed will illustrate the similarity between this industry and others. This company, makers of trains, educational toys and motor-driven household appliances, started to manufacture trains in 1938 after purchasing



G. F. Schumacher, whose portrait appears on the cover of this issue, has devoted his time to the manufacture of electric trains since 1924 when he became associated with the American Flyer Manufacturing Corp. After this company merged with the Gilbert Company, he was retained to instill his know-how into the new line of trains which continues to carry the trademark of American Flyer. Currently, Mr. Schumacher is responsible for production engineering, cost control, purchasing, quality control and plant engineering in the organization.



Fig. 1. Locomotives are drawn to scale working direct from outline drawings supplied by the builder. Modifications in detail are made only where necessary to fit the small-scale reproduction and to provide economical production.

the American Flyer Manufacturing Co. in Chicago.

Electric trains, about 30 years ago, were crude "tin plate" models having little resemblance to actual trains beyond the fact that they were self-propelled and had flange wheels to run on tracks. By contrast, a toy train of today follows rigidly, insofar as practicable, the actual scale details of its real counterpart.

Three scale sizes are currently on the market. They are the O, S and HO gages which are 1/4-inch, 3/16-inch and 3.5-mm scales, respectively. Gilbert, however, builds only the S and HO gages. The company believes that the 3/16th scale or S gage is the most practical, especially as a boy's toy. It allows

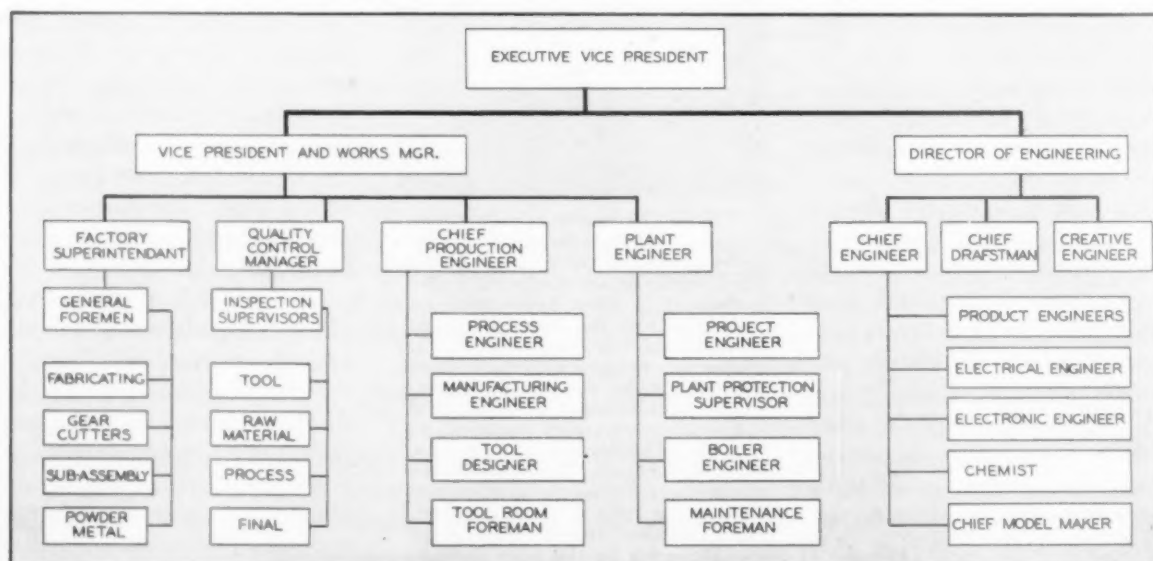
for realistic proportions without requiring excessive lengths for locomotives and cars. The 3.5-mm scale or HO gage is ideal for adult hobbyists but not for children because its small size requires almost meticulous care in placing trucks and in handling train units.

**New model design:** After conferences involving management, sales, engineering and production to determine which locomotive is to be added to the line, the builders such as Baldwin or American Locomotive are contacted for photographs and detail blueprints. From these, necessary drawings are made to the 3/16th scale for study by a tool conference composed of tool engineers, draftsmen, design engineers and time study men. This group determines if the particular design fits the available manufacturing processes in every respect and suggests changes as required.

From revised drawings incorporating recommended modifications to facilitate production, a mockup is made. This is studied productionwise and, if deemed satisfactory, a complete hand-made model is produced. Detail drawings for the piece parts and complete specifications are then made.

Tool cost is estimated from these prints and the cost of the unit is approximated. With this information, the drawings are released to the production engineering department. There it is determined how the parts are to be made and on what type of machinery. All tools and dies are designed in Gilbert's shops according to recognized standards. It is the company's policy to purchase the latest type of machines and build dies and fixtures accordingly. Sometimes it takes as much as one year from

Fig. 2. Organizational chart of management and supervisory personnel.





the start of engineering until the tooling for a locomotive is completed.

**Sample lots:** After completed dies have been released through the tool inspection department to the production department, a sample lot of 12 to 24 pieces is run. The inspection or quality control department checks the parts against the prints, indicating any deviations. These marked up drawings are then reviewed by the chief production engineer. If there are any deviations on any dimensions, a joint meeting between design and production engineering departments determines whether the parts are to be changed to exact dimensions as previously specified or if the prints should be changed accordingly.

If all the assembled parts in the sample run fit properly, a pilot run of 1000 pieces goes through the plant. Any production problems that show up at this time are straightened out. Records are kept carefully. From them, production schedules are made which are released through the sales department to the planning section. When the job is started on the line, production and design engineers and methods men are sent along to check that everything adheres to specifications, that the tools work satisfactorily, and that there are no "bugs" in the line.

**Scheduling:** All parts are scheduled in the plant on a six-month basis. These schedules are broken down according to the shop section involved and the parts are fabricated accordingly. They are



Fig. 4. One of the plastic molding machines making locomotive tender bodies. Similar one-piece moldings are used for locomotives and cars and have reduced the number of assembly operations on the conveyor line.

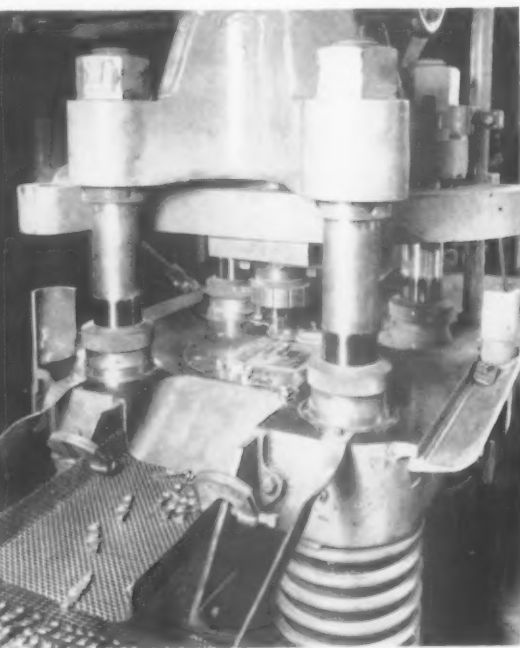
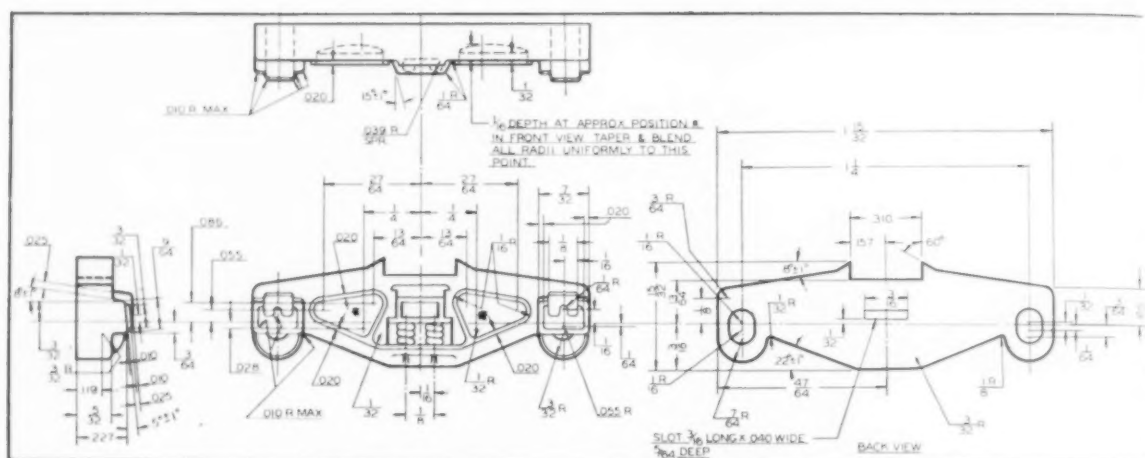


Fig. 5. Simple pressing operation produces green powder-iron truck frames having realistic detail. Formerly the truck frames were assembled stampings.

Fig. 3 (left). Typical die casting machine producing locomotive bodies.



scheduled for completion one month prior to the assembly schedule. A few parts are purchased on the outside. These are scheduled to be in the shop two months ahead of actual production schedule.

To assure that production follows the schedules, expeditors from the purchasing and production control department follow orders, materials, and purchased parts as well as bottlenecks in the production line. If a bottleneck cannot be broken immediately, the expeditor reports back with recommendations for resuming production on schedule. Everything that does not happen on time is called

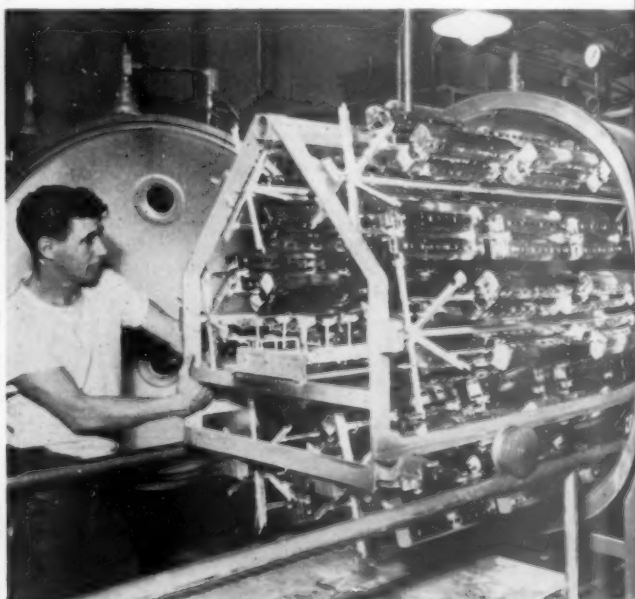
a bottleneck and the shop is impressed that bottlenecks cannot continue to exist.

**Production:** Most of the production is performed in the plant, including practically all of the die casting, 100 percent of the metal fabricating such as pressed parts, 80 percent of the plastic molding, and about 60 percent of the screw machine parts. The reason for purchasing parts is to preclude the possibility of becoming machine poor in case of reverses caused by a depression or recession.

Some locomotive bodies are zinc diecast such as those for the Union Pacific train illustrated in *Fig.*



**Fig. 7. Loading a sintering furnace with green powder metal parts. After sintering these high-strength parts require no trimming and little if any machining, producing a highly economical part even though powder iron itself is expensive.**



**Fig. 8.** Vacuum metalizing chamber where plastic locomotive and car bodies receive a bright-metal coating. When the chamber is evacuated, heat melts fine aluminum wire which flash coats the cars on rapidly revolving fixtures in the chamber.

Locomotive chassis for all the trains are zinc diecast. This casting forms the housing for the wheel assemblies, the electric motor and the drive gearing. Zinc makes an excellent material for this component because of its weight. Being the lower part of a locomotive, it provides the required wheel traction for pulling long trains. Considerable ballast is cast into the rear of this chassis.

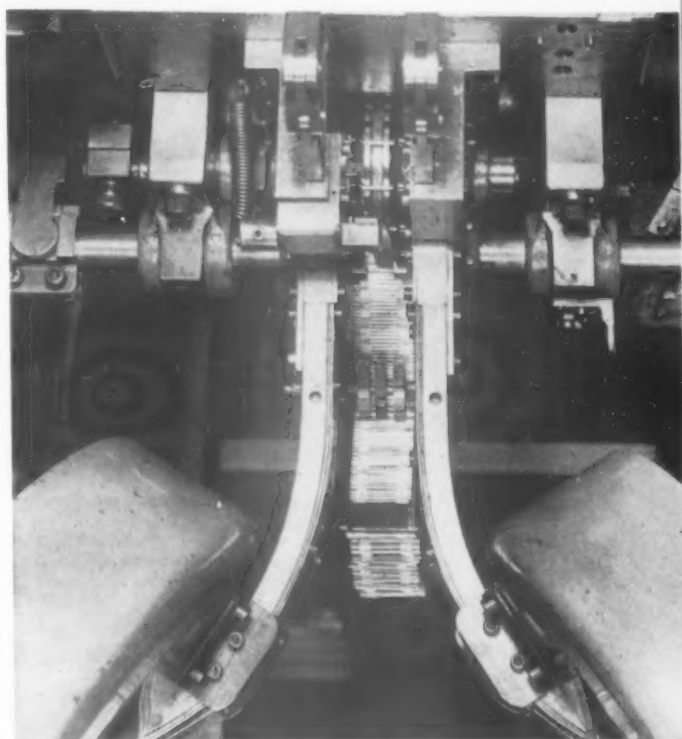
Plastic molding, *Fig. 4*, is being utilized extensively in new models for car, coach, locomotive, and tender bodies. High impact copolymer Styrene is employed generally for this purpose because it is simple to fabricate and practically indestructible in this application. In fact even though a car body is cast in thin section it may be dropped or stepped upon without damage. Another advantage of molding is that a locomotive body is produced in one piece whereas diecasting would require the assembly of three parts—boiler, boiler front and cow catcher.

One of the newest processes being employed and which has proved particularly advantageous both from economy in production and realism in detail is iron powder pressing and sintering. Although relatively new, the process is being employed for gears, wheels, knuckler couplings and truck side frames as shown in *Figs. 5, 6 and 7*. The finished parts have excellent mechanical properties, reproduce intricate details without difficulty and, in many instances, simplify assembly by reducing the number of parts required.

**Finishing:** Practically all the components employed in a train receive a lacquering, painting, metalizing, or plating treatment. This applies even to the plastic bodies. Painting is employed for realistic effects, actual colors and appearance of surfaces being duplicated as closely as possible. The body colors are sprayed either manually or automatically and the lettering or trim colors are printed on the parts with a job press similar to those employed in a letter-press printing plant.

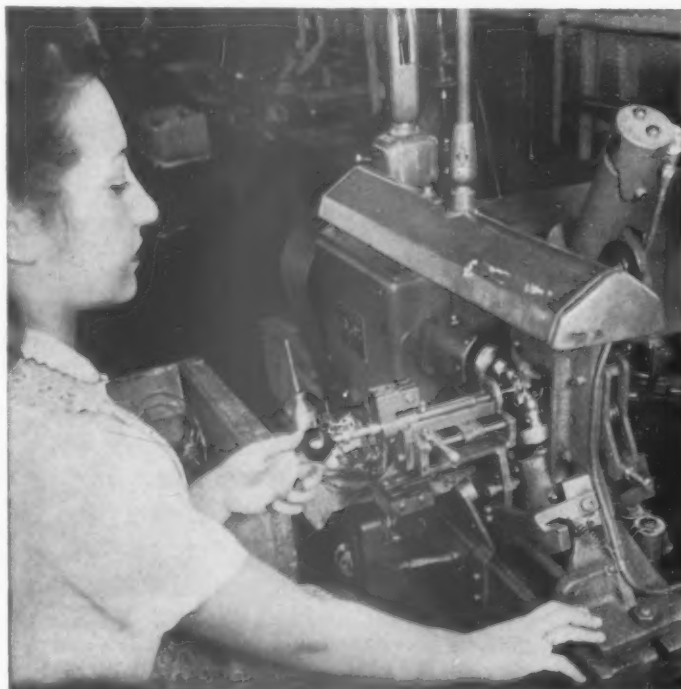
The newest process employed in the finishing department is vacuum metalizing, *Fig. 8*, whereby a bright metal finish is coated upon the plastic bodies of streamlined trains. In this process, the Styrene parts are first sprayed with a lacquer undercoat to give a smooth base and prevent discoloration or bleeding through. This coat is baked for 1¾ hours at 130 F. The parts are then loaded on six revolving racks on a frame and placed in a vacuum chamber together with small lengths of aluminum wire hung on tungsten filaments in the frame.

Vacuum is drawn in the vessel to ½ micron, abso-



**Fig. 9.** Hopper-fed automatic machine for assembling wheels to their axles. Wheels are oriented and fed from hoppers on each side to axles which have been located in slot stations on the machine dial. As the dial indexes, the machine presses on the wheels and locates them to gage position.

**Fig. 10.** Coil winding machine simultaneously winds three coils on the motor armature and ejects the wound units much like link sausages.







**Fig. 11. Dial assembly of track sections.** Operators place ties and rails in position. The machine insulates the rails from the ties and stakes them. Also, an electrical test of the insulation is performed automatically in the last station.

lute, at which time the tungsten wire is heated to the melting point of aluminum at this pressure. When the aluminum melts, the contents of the vessel are flash coated with a deposit of 3 to 5 millionths inch of aluminum. To retain the bright finish of the deposit, a finish coat of lacquer is

applied to the parts and either air dried or forced dried, depending on production schedules.

**Assembly:** Wherever possible, parts are assembled into subunits and automatic equipment is employed whenever the parts lend themselves to that type of handling within production schedules. Hopper feeding of parts to dial machines and other types of automatic machines is utilized extensively. For example, *Fig. 9* shows a machine for assembling the powder-metal car wheels to their axles on a vertical-station machine, and *Fig. 10* illustrates a semiautomatic machine for winding the drive motor armatures. The armatures and shafts are assembled with the insulated commutators and are fed by an operator into the machine. All three armature coils are wound simultaneously and are ejected from the machine automatically much like link sausages in that the coil wires are not cut between armature winding cycles. This single machine does the work of at least six winders previously employed.

All parts flow from the various departments—machining, spot welding, finishing, molding, stockroom, etc.—to the assembly lines such as seen in *Figs. 11* and *12*. Each item has its own dial assembly machine or conveyor line, there being about



**Fig. 12. Locomotive assembly line** where all components are attached as the locomotives and tenders progress along the conveyor. In this line the chassis subassembly with wheels, motor and gearing is assembled to the body together with stepping relay, headlamp, chugger, smoke unit, etc.



to assembly conveyors in the plant. At the end of every line is an inspector to test the merchandise produced. After acceptance, it is packaged and sent to the shipping department where the various packaged components are assembled into train units. All packaged accessories for a train are scheduled to meet in the proper quantities and at the proper time.

To keep the assembly line running continuously and to provide extra operators for replacements on a conveyor assembly, a small amount of assembly is performed off the regular line. Absenteeism on the conveyor is filled from the assembly bench and the reserve production from that bench is employed whenever needed.

**Testing:** Inspection such as shown in Fig. 13 is employed throughout the production lines. Every locomotive, car and track section has 100 percent inspection at the end of the assembly lines. In addition, 2 or 3 percent of all articles produced are put on a performance test, Fig. 14, and a percentage of these units are then placed on a life or breakdown test. Records of these tests are studied carefully to disclose any possible weakness in design or manufacture so that corrective measures and improvements may be made.

**Research:** Development work is carried on in collaboration with the engineering department. New materials and new methods of manufacture are constantly being studied. Typical is the powder-metal program now in operation. At the present time there are 24 items being produced by that process, including car wheels, car trucks, knuckle couplers, and gears for trains. When the application is proper, powder-metal parts have advantages over other fabrication methods. Cost is lower, performance is improved and more intricate details may be incorporated in the dies to enhance realism. This is particularly true of the trucks which were formerly stampings with assembled journal boxes for decoration. Powder-metal trucks are produced to a more accurate scale without requiring an assembled journal box. Also, powder-metal has proved ideal for the knuckle coupler. This part was found to need additional weight which was provided effectively and economically.

Production philosophy of the Gilbert company is to give every train component as thorough and as exacting a test as is possible, insuring that each train will perform satisfactorily and without disappointment. The slogan "To make boys happy on Christmas morning" is instilled in every worker throughout the plant.



Fig. 13. Inspection station where chassis assembly of wheels, motor and gearing is tested for performance before final assembly.



Fig. 14. Final test of complete train where sample lot testing is performed to assure that design and production techniques are coordinated.

# Statistical Evaluation

## of Rational and Stratified

## Methods of Sampling

By Dr. James V. Strela

STAFF STATISTICIAN  
THOMPSON PRODUCTS, INC.

### Part V

IT IS BELIEVED that from the previous discussion it has become obvious that since the natural limits of process variability or capability are estimated from the  $\bar{R}$  of  $m$  subgroups of  $n$  values, depending on the method of sampling and the complexity of the process, such estimates may vary considerably. In Fig. 8, therefore, the data on which the previous two charts are based are presented as the  $\bar{X} \pm 3\sigma$ , dispersions based on the two methods of sampling. Since the figure is properly described, no detailed analysis is deemed necessary.

Briefly, except for the process  $D$ , the estimates of these dispersions are about the same for both methods of sampling, as indicated by the heavily shaded areas at the respective tails of the schematic normal curves under consideration. To return to the former cake analogy, a horizontal slice of a single dough cake is as reliable a test of its composition as a vertical slice. For this reason, in the figure, these estimates for the three component distributions are represented by one curve alone, except for the respective tips of those curves constituting the differences due to the two methods of sampling.

It is to be noted that in the process  $D$ , for which the estimated dispersion is illustrated separately for each method of sampling, the difference between the two estimates is considerable. To use again the layer cake analogy, a horizontal slice of such a cake will reveal only the variability within the respective layer sampled. Only a vertical slice gives a picture of the increased variability within as well as between the three layers.

Analogies always fall short at some point. It may be stated that, in quality control, the aim is not to make a layer cake, unless it be made from the layers of the same dough and composition, such as desired by the engineering quality specifications.

But such an argument is only half true; it expresses mere wishful thinking and not what is usually the real situation. Whenever the same operation characteristic, such as outside or inside diameter, length, taper, radius, volume, hardness, tensile strength, and also such seemingly unrelated characteristics as time cycle, efficiency, wage rate, budgetary expenditure, etc., involve several people, several tool set-ups, several machines, or simply values produced in various segments of time, the problem of stratification enters in and is likely to assert its influence on the determination of the standards under consideration. If management is interested in the difference between the potential and the actual standards, then it is necessary that the personnel concerned with such standard determinations be aware of the possible pitfalls inherent in an unsuitable method of sampling. Such caution must be especially exercised on operations requiring a restricted quality specification. However, since the word quality has a much broader meaning than that customarily assigned to it in the technique of dimensional control of quality, caution is to be recommended in any method improvement which may be tested by the pattern of the resulting numerical values.

### Rational and Stratified Sampling Compared for Liberal and Tight Specifications

For the purpose of this paper, the quality specification previously assumed was purposely chosen to coincide with the natural limits of variability of the Thompson sampling machine when operated on the horizontal plane. Under those conditions, in spite of the fact that the mean of the process component distributions  $B$  and  $C$  shifted  $-2.684$  and  $4.010$  in respect to the  $\bar{X}_{sp} = \bar{X} = 0$  of what may be called

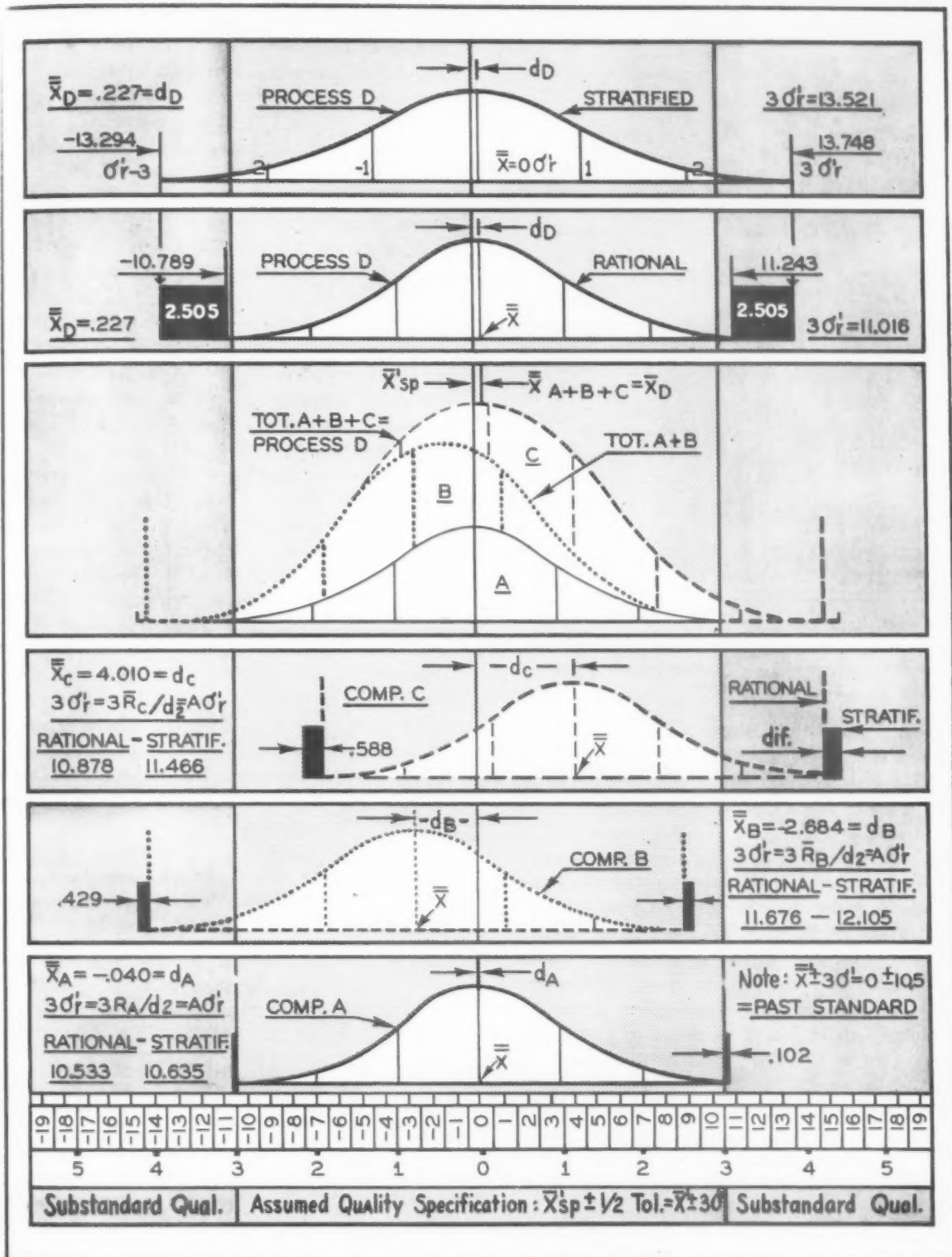


Fig. 8.  $\bar{X} \pm 3 \sigma'_r$  of component and combined distributions estimated from  $\bar{X}$  and  $R$  of 40 rational and 25 stratified samples of 25 and 40 values  $X$ . Here the data on which the charts in Figs. 6 and 7 are based are presented as the  $\bar{X} \pm 3 \sigma'_r$  dispersions based on the two methods of sampling. In process D, it can be seen that the difference between the two methods of sampling is considerable.

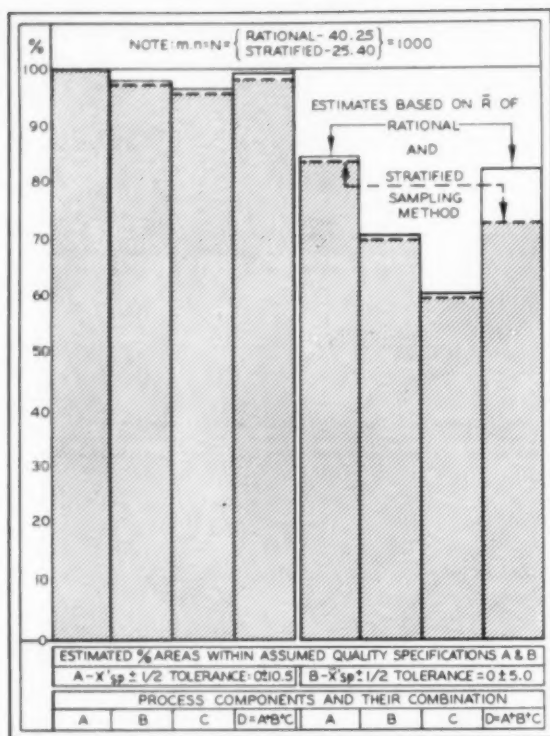


Fig. 9. Comparison of percentage areas under the normal curve within two assumed quality specifications based on  $\bar{R}$  of  $m$  subgroups of  $n$  values  $X$ .

the basic process represented by the 5,000 values illustrated in Fig. 1, the largest portion of the normal curves representing those component distributions are still within the wide assumed quality specification  $0 \pm 10.5$ . Consequently, even if with an unsuitable method of sampling a wrong estimate of the actual process variability is obtained, if that process is at the same time characterized by a liberal quality specification, not much harm is likely to result from such method of estimation. On the other hand, since the greatest area of the normal curve, which represents a controlled process, is within its  $\bar{X} \pm 1\sigma$  dispersion, even a relatively small error in the  $\sigma_r$  estimation may cause considerable error in the estimate of the percentage of quality values produced by a process with narrow quality specifications.

To illustrate this point, the two sets of bar diagrams in Fig. 9 represent the percent areas under the normal curve within two sets of quality specifications, one liberal, one tight; but in both cases those estimates are based on the  $\sigma_r = \bar{R}/d_2$  derived from the two methods of sampling previously considered. The solid line on the top of each bar represents the percentage estimated from the  $\bar{R}$  of the rational samples; the dotted line represents the same percentage, but estimated from the  $\bar{R}$  of the stratified samples previously analyzed through the control chart method. The first four bars pertain

to the assumed quality specification,  $0 \pm 10.5$ , the other four to the assumed quality specification  $0 \pm 5.0$ . The symbols  $A, B, C$  identify the previously discussed component distributions of 1,000 values each, the distribution  $D$  represents an approximate one-third of their combinations.

The figure is believed self-explanatory, for it is but another portrayal of the conditions schematically analyzed for the wider quality specification by the schematic normal curves in the preceding figure. It is to be particularly noted that, for the wide quality specification assumed, the difference between the two percentages based on the two methods of sampling is small for the three component distributions as well as for their combination into the process  $D$ . However, in the case of the narrow specification the difference, due to the method of sampling, in the case of the composite process  $D$  is considerable.

Those unfamiliar with shop operations may be of the opinion that the examples artificially created by the values from the sampling machine may be extreme to stress a point. The fact is that because of the physical limitations of the Thompson sampling machine, the examples shown rather minimize conditions prevailing in practically all shops where no statistical method is used to guide the judgment of those in charge of the process operations. As much as 40 percent or more rework is sometimes produced by the most conscientious operators under the supervision of equally conscientious floor inspectors, simply because of the lack of knowledge or application of the statistical tools developed and used here. However, mere routine application of such tools is no guarantee of producing the greatest amount of quality at least cost. A professional skill in the application of such tools definitely requires the awareness of their limitations.

"Fig. 4."

#### Errata

In Part II, published in September, the following corrections should be made: Line 1, col. 1, p. 63, " $X \pm 3\sigma$ " should read " $\bar{X} \pm 3\sigma_r$ ."

In the chart on page 64, following " $\sigma_r$  Estimates," " $\sigma_r = R/d_2$ " should read " $\sigma_r = \bar{R}/d_2$ ."

On page 65, line 30, col. 1, "as the  $\pm 3\sigma_x$  limits" should read "as the  $\pm 3\sigma_{\bar{x}}$  limits;" line 38, col. 1, " $\sigma_x$ " should read " $\sigma_{\bar{x}}$ ;" the same correction should be made in line 45, col. 1.

The first line of equation (7) on page 66 should read " $\bar{X} \pm 3\sigma_r = \bar{X} \pm 3\bar{R}/d_2$ ."

The second line of equation (8) on page 66 should read " $= \bar{X} \pm 3\bar{R}/d_2\sqrt{n}$ "

In the last line of col. 1, page 66, " $R$ " should read " $\bar{R}$ ."

In Part IV, published in November, "Fig. 3" in the last line, col. 1, page 59 should read "Fig. 4."



# ASTE Inaugurates Leadership Conference

By L. B. Bellamy  
President  
American Society of Tool Engineers



Unprecedented in the history of any technical society, a two-day leadership conference has been planned for March 16 and 17 at national headquarters in Detroit. Newly elected chairmen of all ASTE chapters in the United States and Canada are being invited to participate in this important event as guests of the Society.

Planned to be held in conjunction with the annual meeting and designed to strengthen ties between the chapters and the national organization, this conference will undoubtedly be one of the most outstanding undertakings of ASTE. Chapter leaders will meet with national officers, directors and committee chairmen in discussion groups and attend the dedication ceremonies of the Society headquarters building.

Information on all phases of chapter activities will provide each participant with immeasurable assistance in conducting the affairs of his chapter. There will be ample opportunity for the interchange of ideas with other chapter chairmen.

Important projects and the programs of all national committees will be discussed, including the Tool Engineering Research Fund, scholarships for college students, professional engineering programs and activities of the book committee. Better methods for working with the headquarters staff will also be outlined as well as a host of other details to facilitate successful operation of a chapter.

To simplify the problems of taking

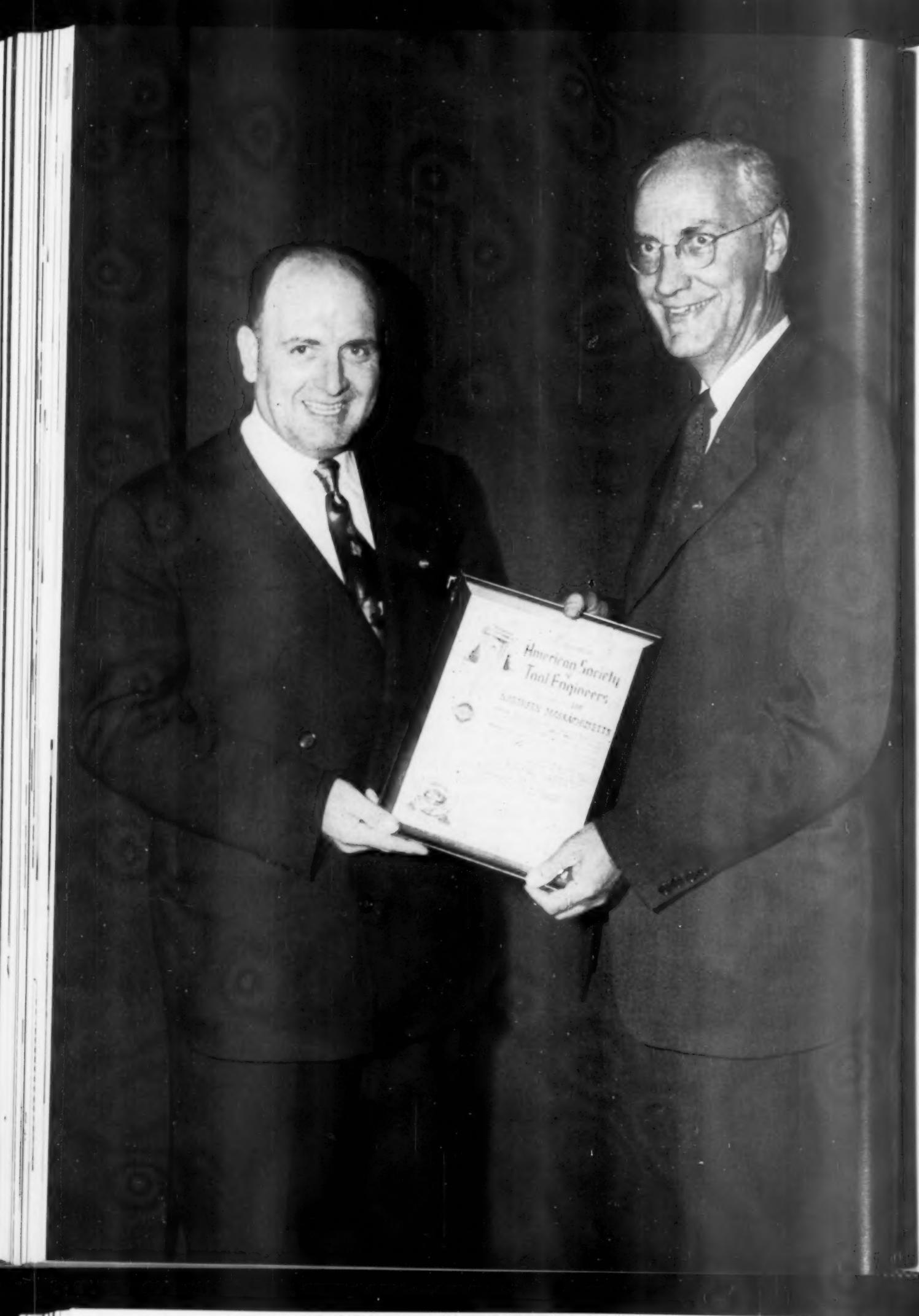
extensive notes, all of the talks presented by the officers and national chairmen will be preprinted for distribution after the sessions. All arrangements are being planned in advance so that everyone may obtain the maximum benefit from the carefully prepared programs.

The dedication of the new ASTE headquarters building will be the highlight of the conference. For this event, it is most fitting that representatives from every chapter should participate because the building was made possible by the membership as a whole.

The tremendous growth and progress of ASTE have pinpointed the need for a meeting where chapter leaders may receive undivided attention for their individual needs. It has always been the sincere feeling of the Board of Directors that no cost should ever be spared if that expenditure would benefit the most important level in the Society—the chapters.

Participation of all chapter chairmen in the leadership conference will benefit each chapter and help promote the dissemination of technical information in the tool engineering field.





# ASTE Charters 100th Chapter

By Nancy L. Morgan

*On October 14, 1952, in Athol, Massachusetts, an event of historical proportions took place. The American Society of Tool Engineers chartered its 100th chapter. Twenty years and six months after the founding fathers of the Society had concluded ceremonies of chartering the first ASTE chapter, a significant milestone had been reached by the world's fastest growing technical society. The 23,000 members of ASTE can take justifiable pride in its new chapter and the progress its chartering represents.*

An impressive audience of 550 ASTE national officials, members and guests witnessed one of the Society's most notable events, the chartering of the 100th chapter. Formed to serve the Northern Massachusetts area, the chapter received its charter on October 14 at Memorial Hall in Athol.

Among those present for the ceremonies were: President L. B. Bellamy, Second Vice President J. P. Crosby, Past Presidents C. V. Briner, Frank Curtis, A. H. d'Arcambal, I. F. Holland, Ray H. Morris, and Albert M. Sargent, and Executive Secretary Harry E. Conrad and Assistant Executive Secretary Allan Ray Putnam.

Mr. d'Arcambal acted as toastmaster for the festive program which also served as the Executives' night meeting of the Worcester chapter. His notes of informality heightened the poignancy of the occasion.

**President Leslie B. Bellamy presents the charter for the Northern Massachusetts ASTE chapter to the chairman, William R. Frazer.**

Greetings of the town of Athol were extended by The Honorable Albert Brown, chairman of the Board of Selectmen. The Rev. R. J. O'Brien of the First Unitarian Church gave the invocation. A specially composed musical salute to ASTE was presented by the Union Twist Drill Glee Club, followed by a selection of harvest tunes, under the direction of Conductor John T. Bone.

After addressing the group on "The Challenge of Survival," President L. B. Bellamy administered the oath of office

Although technically just becoming active on October 14, the chapter actually had five previous meetings, with not less than 150 in attendance at each.

Toastmaster d'Arcambal presented Chairman Frazer with the chapter chairman's pin, to be worn during his term of office and then turned over the chapter's next chairman.

After conveying the best wishes of the Worcester chapter, Chairman Roland Ljungquist presented Dr. Frazer with a handsome gavel "to conduct a series of most successful meetings."

Here is the text of a telegram sent to L. B. Bellamy from Dwight D. Eisenhower, president-elect of the United States:

"Congratulations on the chartering of the one hundredth chapter of the American Society of Tool Engineers. You and your associates may well be proud of this milestone which represents both past achievement and dedication to the creation of a better world for free men and women everywhere. Best wishes for continued success in a highly challenging cause."

to the charter officers of the Northern Massachusetts chapter. They are: William R. Frazer, chairman; Glen H. Stimson, first vice chairman; Leo A. Tourigny, second vice chairman; Roger Tolman, secretary; and Elliot D. May, treasurer.

The actual presentation of the charter followed, bringing legal life to Chapter 100. Chairman Frazer accepted for the 130 charter members. He emphasized the strong encouragement and help of the sponsoring chapter, Worcester, which made the charter night a reality.

Greetings from the national headquarters of the Society were extended by Executive Secretary Conrad. Roger E. Gay, president of the Bristol Brass Co. and newly-elected member of the ASTE Tool Engineering Research Fund Committee, presented an address entitled "The General Economic Outlook for Manufacturing."

The chartering dinner and ceremonies were preceded by afternoon tours through the plants of the Union Twist Drill Co. and the L. S. Starratt Co. and a reception given by the two firms.



Top photographs: Taking part in the chartering program of the Northern Massachusetts chapter, from left, were: A. H. d'Arcambal, toast master; A. H. Starrett, president of L. S. Starrett Co.; I. F. Holland, president of Union Twist Drill Co.; A. H. Brown, chairman of Athol Board of Selectmen; W. R. Frazer, chairman of the chapter; G. H. Stimson, first vice chairman; E. D. May, treasurer and Roger Tolman, secretary.

Middle photograph: Past presidents of ASTE on hand for the program were: I. F. Holland, Ray H. Morris, Mr. d'Arcambal, A. M. Sargent and C. V. Briner.

Lower photograph: National ASTE officials attending the charter night ceremonies included: Executive Secretary Harry E. Conrad, President Bellamy, R. E. Gay and Second Vice President J. P. Crosby.



Photographs by Worcester Evening Gazette

## Charter Members of Northern Massachusetts Chapter

Robert H. Alberti  
Herbert S. Aldrich  
Paul V. Anderson

John R. Badertscher  
Joseph W. Ballard, Jr.  
Dorman L. Barger  
Raymond A. Bartlett  
Clinton W. Berry  
Harold R. Blake  
John E. Bock  
Reginald E. Brackett  
Richard R. Braddock  
Robert G. Bryant  
Martin C. Butters

James A. Cameron  
Allen J. Carruthers  
Roy E. Comstock, Jr.  
John Crowningshield

James T. Daley  
Ernest N. Daulton  
Phil A. Deam  
Joseph F. Dowd  
Gordon L. Duplessie  
William A. Duplessie

Donald W. Eaton  
Dino J. Emanuelli  
Alfred H. Emery

Arthur R. Fennell, Jr.  
Clarence M. Fielding  
Gerald R. Fontaine  
Earle W. Foster  
William R. Frazer

Harold A. Gardner  
Willard H. Garrand  
Arthur H. Gerry  
Winton H. Gleason  
Gardner S. Gould, Jr.  
Gardner S. Gould  
Julius L. Gould  
Chester Graham  
William J. Greene  
Charles L. Greenleaf  
Paul C. Grimes  
Harold S. Groves

Warren A. Harris  
Alton B. Hastings  
Donald E. Hastings  
Charles W. Hayden

Fred J. Hennard  
Charles A. Hoehn  
George F. Holland  
Paul E. Holm  
Donald F. Holmes  
Andrew C. Hood  
Hugh A. Horrigan

Brian B. B. Jacobus  
Charles H. Jones

Christy Karr  
Arthur J. Kelley  
Earl W. Kelton  
Joseph Kruger

William P. Lawrence  
John B. Lee  
Ernest Leonosio  
Orie H. Lund

Howard D. MacDonald  
Norman W. Mackay  
Elliot D. May  
William T. McBride  
James H. McIntosh  
Howard E. McQueston

Frederick T. Meehan  
Richard W. Moriarty  
Robert M. Morrison  
Harold I. Moss  
Norman F. Nau  
Otto S. Nau  
Robert A. Nelson  
Carl G. Nordmark

Uno O. Oakland  
Ernest J. Oates  
Chester L. Oberg  
Norman M. Olson

Howard W. Parker  
Finley J. Parks  
Leonard H. Pauze  
Milford H. Perkins  
John D. Phillips  
John S. Piragis  
Alton A. Prentiss  
Vincent J. Purple  
Edward J. Rahaim  
Stanley C. Ralys  
John H. Robinson  
Richard B. Robinson  
Hermann E. Rose  
K. W. Rosewarne

Daniel K. M. Scott  
Lewis A. Scott  
Sullivan G. Scott  
John H. Scribner  
Alexander Shaw  
G. D. Shepardson, Jr.  
E. T. Siemiakowski  
Clyde N. Simpson  
Stuart E. Sinclair  
Douglas R. Starrett  
Edwin B. Starrett  
Raymond F. Starrett  
John E. Storm  
Peter J. Svetaka  
Clyde H. Swan, Jr.

Philip R. Thayer  
Roger H. Tolman  
Richard B. Tourigny  
Oscar A. Towne, Jr.  
Donald H. Tuttle  
Vernon E. Vaughn

Norman G. Walsh  
Norman F. Walters  
Robert A. Washer  
Richard Waterman, Jr.  
Arthur E. Williams



## First Meeting Held by Research Fund Committee

The first meeting of the newly elected members of the ASTE Tool Engineering Research Fund Committee was held October 28 at ASTE headquarters in Detroit to discuss plans for carrying out scientific research projects in the fields of manufacturing, manufacturing processes, and allied tool engineering fields.

Members attending the meeting were David A. Wallace, president of Chrysler Corp., Detroit, Mich.; Roger Gay, president of Bristol Brass Co. of Bristol, Conn. and also president of the American Standards Association; Louis F. Polk, president of the Sheffield Corp. of Dayton, Ohio; and Robert B. Douglas, president of Godscroft Industries and Specialloid Inc., Ltd. of Montreal, Canada, who is serving as temporary chairman of the committee.

In addition to laying tentative plans to make use of industrial laboratories, colleges and universities throughout the nation to carry out research projects, the committee named Frank W. Wilson, ASTE technical director, as acting technical director of the fund, and Harry E. Conrad, ASTE executive secretary, as acting secretary.

The Society has already appropriated \$75,000 as an initial contribution to assist in the establishment of the Tool Engineering Research Fund.

## ASTE Members Elected to United States Senate

Voters in the states of Vermont and Connecticut have elected two members of ASTE to the United States Senate. An honorary member of the Society, Senator Ralph E. Flanders was re-elected November 4 by the voters in Vermont. William A. Purtell, of the Hartford chapter, was elected to his first term of office as senator from Connecticut.



Shown at the first meeting of the Research Fund Committee, seated, from left, are: Robert B. Douglas, Louis F. Polk, Roger Gay and David A. Wallace. Standing are other ASTE officials on hand for the October session: Albert M. Sargent, past president; Roger F. Waindle, first vice president; Harry E. Conrad, executive secretary; Leslie B. Bellamy, national president; and Frank Wilson, acting technical director of the fund.

## Executive Speaks at Rockford ASTE Meeting

Rockford, Ill.—A near-capacity crowd of 150 Rockford ASTE members and guests attended the October 9 dinner meeting held at the LaFayette Hotel.

Herman Goldberg, president of the Snow Mfg. Co., Bellwood, Ill., was the technical speaker. His program on drilling and tapping included a demonstration on one of his company's machines. The informal question and answer period, held after the talk, lasted more than an hour.

Coffee speaker was William L. Hockstead, executive secretary of the Community Chest. He spoke on the activities and campaign of the Community Chest.

On October 14 a group of high-school instructors in the Rockford area met with the chapter's education committee to discuss a contest sponsored by Rockford ASTE members. Designed to stimulate interest in high-school technical courses and careers in tool engi-

neering, the contest is open during the first semester of the school year to students in mechanical drawing. Cash awards will be made to students from each school who show the greatest improvement in the opinion of course instructors. Total achievement will also be a consideration. The five top students from each school will be guests of the chapter on a field trip or similar event.

## Wayne Kay Appoints Two Committee Members

Two appointments to the national editorial committee of the Society have been announced by Editorial Chairman Wayne Kay of Detroit. They are Lee Murray Davis, Springfield, Vt., and Edward W. Dickett, Rockford, Ill.

Mr. Davis is a charter member of the Twin States ASTE chapter. He has served as Twin States' chairman and in many other chapter capacities.

A charter member of the Rockford chapter, Mr. Dickett has served as a national committee chairman, director and a national officer of the Society. He has also filled numerous posts of the Rockford chapter, including the chairmanship.

## Larson Named Editor

Enfried T. Larson, formerly a sales engineer with the Norton Co., has been appointed editor of technical publications for the firm. He is responsible for editing the company magazine as well as all technical and educational booklets and bulletins for the firm. A member of the Worcester ASTE chapter, Mr. Larson has been associated with Norton for 29 years.



A clambake held September 13 at Sweets Farm found enthusiastic golfers of the Rochester ASTE chapter enjoying one of their favorite sporting events. A large turnout, a fine day, grand food and entertainment indicate that the clam bake will probably turn into an annual event.



The charter for the Keystone chapter is presented by Thomas J. Donovan, national director, to Jack Lipman, chairman of ASTE's 101st chapter. From left: Mr. Donovan, First Vice President Roger F. Waindle, Mr. Lipman and Dr. Harry B. Osborn, third vice president.

## Keystone Chapter Receives Charter

The 101st chapter of ASTE was chartered at ceremonies at the Hotel Jermyn in Scranton, Pa., on the evening of October 23. The newest chapter of the Society, the Keystone chapter includes a membership of more than 90 tool engineers.

Main speaker at the banquet was Roger F. Waindle, first vice president, who discussed "The ASTE National Organization, Its Aims and Objectives." Mr. Waindle highlighted the many programs and services of the Society and told of the extensive activities of its national committees. He also complimented members of the chapter and the organizing committee "for a job well done."

Other Society officials attending the charter night meeting were: Dr. Harry B. Osborn, third vice president; Thomas J. Donovan, Jr., national director; and Harry E. Conrad, executive secretary.

The installation ceremonies were conducted by Mr. Donovan who presented the 101st charter of ASTE to the Keystone chapter chairman, Jack Lipman. Other charter officers of the chapter are: Harlon Von Goldberg, first vice chairman; Thomas J. Clark, second vice chairman; J. Hayes Evans, secretary; and William L. Walsh, treasurer.

Mr. Donovan reviewed the opportunities and responsibilities associated with membership in the Society, citing the growth and progress made by ASTE since it was founded more than 20 years ago.

The chairman's pin and the gavel were presented to Mr. Lipman by Dr. Osborn.

Mr. Conrad spoke to the charter members and guests on the investment made in joining ASTE and urged active participation in all chapter activities and service on chapter committees if

that investment is to net the greatest return.

The membership kit was presented to Frederick C. Oblom, chairman of the Keystone chapter membership committee, by Emil Kitzman, area captain of the national membership committee from Philadelphia.

The duties of the toastmaster for the evening's program were handled by Fred Borggreve. Wires of congratulations from President L. B. Bellamy and Andy Clark, chairman of the national membership committee, were read to the audience by Chairman Lipman.

Appointments of committee chairmen for the chapter include: John L. Somers, constitution and bylaws; Kenneth H. Colville, Jr. standards; Robert Fitzsimmons, program; Wilfred H. Kuhn, editorial and public relations; and Stephen Sworen, education. Other committee chairmen will be announced later.

# Charter Members of Keystone Chapter

Joseph M. Alexander

George J. Lynch

Edward S. Barrows

James E. McAleer

Donald P. Blanc

Philip T. Medico

Herman W. Booker

William F. Medico

Charles E. Borg

J. Frederick Morrow

Frederick W. Borggreve

Michael Mrvos

Charles D. Bradburn

George F. Mulligan

John F. Brady

Angelo J. Bugianesi

Albert E. Neyhart

Carmen J. Notartomas

Thomas E. Carroll

Thomas J. Clark

Allan B. Collins

Kenneth Colville, Jr.

Frank Z. Cueto

Frederick C. Oblom

Raymond W. Olinski

Benjamin G. Dann, Jr.

Stephen L. DeBarry

John J. Delaney

Thomas O. Drummond

Robert F. Pace

Herbert O. Patchel

Andrew J. Pavlowski

Sherman Ranck, Jr.

Victor A. Reese

A. Hanford Eckman

Jackson F. Eckstein

Robert Erickson

David R. Evans

James H. Evans

George Salivonchik

Wayne W. Sanders

Melvin J. Schaffer

Paul Sciacchitano

Paul Sernak

Gerald Smith

John L. Somers

William F. Spelman

Fred C. Strenk

Henry V. Sullivan

Walter W. Swartz

Robert I. Sweet

Stephen Sworen

Ralph E. Faatz

Nils H. Feldt

Robert Fitzsimmons

Benjamin W. Frantz

Joseph A. Gallagher

Carl E. Gingham, Jr.

Joseph S. Good

C. Richard Gordon

Walter G. Thomson

Philip D. Harvey

Gordon E. Henry

Philip Heycock

James E. Hill

Carmen J. Uritz

Russell V. Jones

Harold B. Vinton

H. S. Von Goldberg

Vincent T. Kane

Paul R. Kautz

William H. Keay

Robert F. Kennedy

Michael Klos

Gunther J. Koch

Paul A. Koorbanoff

Joseph Kopin

Herbert J. Kozichuk

Wilfred H. Kuhn

Jack J. Kuzmak

Alfred Wall

William L. Walsh

Henry H. Weilage

Henry I. Werden

Grant L. Wheeler

Arthur E. White

Russell B. White

Earl Williams

Edward P. Williams

Otto C. Willig

Laurence A. Young

Jack Lipman

Robert B. Long

Joseph E. Zimmisky







## Pictorial Review of Semi-Annual Meeting



Top row, left: ASTE members are shown on a plant tour of the Worthington Corp. In the right hand photograph are pictured a few of the wives who participated in the program of ladies' activities. Robert B. Douglas, past president, pictured directly above with the Rev. Charles Broughton, acted as toastmaster at the banquet.



Participants in the national committee chairmen's meeting are shown in the top photo at the left. From left: J. O. Horne, J. N. Edmondson, Arthur Diamond, Wayne Kaye, W. F. Jarvis, R. C. W. Peterson, F. J. Sehn, L. F. Hawes and John Greve. Being sworn in at the board meeting by President Bellamy are: Roger F. Waindle, W. G. Ehrhardt, F. J. Schmitt and G. A. Rogers. The lower photograph shows a portion of the crowd at the Friday evening banquet.





## Twin Cities Members Honor Past Chairmen

Minneapolis—October 1 was Past Chairmen's Night for members of the Twin Cities ASTE chapter. Ten of the chapter's 12 past executives were honored at the dinner meeting held at the Covered Wagon Cafe.

They were Peter S. Tobias, Loren C. Blanchar, Raymond L. Martin, Harold D. Sullivan, Clifford V. Lofdahl, John A. Harrington, Wallace A. Ahlberg, William E. Boker, Francis Gruber, and Kenneth Roby.

Mr. Roby, the chapter's charter chairman, presided at the business meeting and gave a few reflections on the growth and progress of the group.

Malcolm F. Judkins, chief engineer, High Temperature Alloys Div., Firth Sterling Steel and Carbide Corp., spoke at the technical session on "Method X." He presented a discussion and demonstration of the machine which converts electrical power directly into energy used to remove metal.

## Navy Officer Speaks to Hartford ASTE Members

Hartford, Conn.—George W. Motherwell, vice president and general manager, Wyman-Gordon Products Co. of Worcester, Mass., presented the technical program for the Hartford chapter at its October 6 meeting. The session, held in the Hartford Gas Co. auditorium, was preceded by dinner at the City Club. Lieut. Commander T. M. Swain, head of the engineering department, Submarine School, United States Submarine Base, Groton, Conn., gave the coffee talk.

Mr. Motherwell spoke on production problems in producing large aircraft forgings on giant hydraulic presses. He covered his experiences in Europe before World War II and told of the large presses he had observed in various countries. The talk was illustrated with a 45-minute movie.

September activities of the chapter were launched with a Ladies' Night held at the Hartford Golf Club. The dinner and dance was attended by more than 100 members and their guests.

Shown just before the September dinner dance of the Hartford chapter are a group of members of the executive committee. Seated, from left: Herbert Richardson, Omer Gingras, Henry Kuryla, Henry Gotta, and Ernest Osterling. Standing: Albert Landry, Joseph Fredricks, Jesse George, Douglas Proctor, Harry Anderson and Robert Gay. The dance was held as part of Ladies' Night activities.

## Positions Available

**GAGE ENGINEERS**—To sell and service gages. Must be young and ambitious with practical experience in the applications of gages, preferably in methods. Should know how to apply gages in quality control and train operators or inspectors in proper use. Factory training for accepted applicants. Many desirable territories. Replies held in strict confidence. Write for interview and state qualifications. Box 1101, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

**MACHINE TOOL DESIGNER**—Long-established machine tool builder located in small Wisconsin city needs designer-draftsman with experience in development of precision machine tools.

Living and working conditions attractive. Salary dependent on ability and experience.

In reply give full details of record and requirements and when available. Our organization has knowledge of this advertisement. All replies held strictly confidential. Box 1202, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

**TOOL AND MACHINE DESIGNERS**—One of Cincinnati's largest permanent design firms has openings in their own office for experienced machine product and tool designers, and detailers.

Recent engineering graduates or students will also be given consideration. These are permanent positions with a substantial, stable leader in the field. We can offer top starting wages, modern working conditions, paid holidays, vacations, and other benefits. Our policies assure varied experience and unusual opportunities with a future.

New employees would be expected to settle on a permanent basis in Cincinnati. Please send resume to Cincinnati Designing, Inc., 57 W. Seventh St., Cincinnati 2, Ohio.

## Cope Speaks on Deep Drawn Shapes

Chicago—ASTE members in the Chicago area met October 6 for a dinner and technical session at the Keymans Club. More than 200 persons attended the meeting. Program speaker was Stanley R. Cope, Acme School of Die Design, South Bend, Ind., who spoke on "Deep Drawn Shapes." He was introduced to the chapter by Harry Conn.

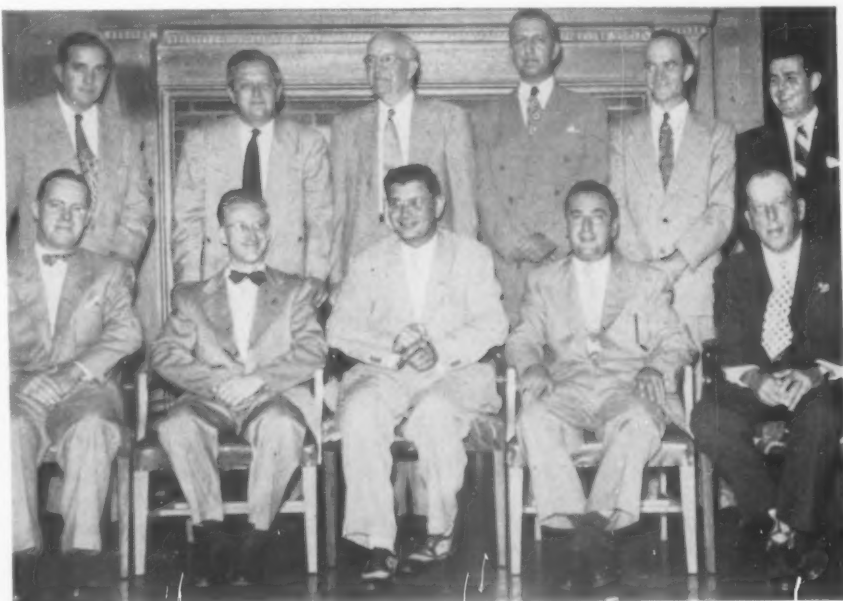
Mr. Cope said carbide is the best material for drawing dies because it has maximum wear resistance and holds a good finish. He described a method of determining the blank diameter accurately to the diameter and depth of the shell at various stages of reduction.

Stressing the importance of air vents, Mr. Cope recommended that they be made twice as large as seems really necessary. In case of trouble, the punch is lowered and withdrawn until the point of trouble occurs. Wrinkles in deep drawing can be prevented by having the stock thickness two percent of the cup diameter.

Dies for drawing magnesium have to be heated in use, Mr. Cope stated. Water dies and bulging dies were also described. In determining the cost of a die, the most important consideration is the proportion of the parts to be made. He also recommended standardization of die parts as a means of lowering costs and simplifying replacement parts.

## Norgren Promotes Schliem

Robert D. Schliem, Denver ASTE member, has been promoted to the position of chief inspector for the C. A. Norgren Co.



## Panel Discusses Coolants for Carbides

Philadelphia—"Coolants for Carbides" was the topic of a recent meeting held October 16, sponsored by the Carbide Group of the ASTE chapter of Philadelphia. A panel of three experts presented their respective methods before an audience of 225 members.

Mr. W. E. Kramer, lubrication research engineer of Gulf Research and Development Co. spoke first on the revolutionary "Hi-Jet." The Hi-Jet method introduces a thin, high-velocity stream of oil between the work and the side clearance angle of the cutting tool. The latent heat of the oil stream is fully utilized, as evidenced by the generation of oil vapor, to provide effective cooling of the cutting edge.

Mr. T. N. Chambers, engineer at Cadillac Div., Cleveland Tank plant, described "CO<sub>2</sub>," a low temperature coolant method. In this case the cooling effect is produced by the change of state of liquid to CO<sub>2</sub> gas. This method is especially adaptable to the grinding of carbide tools. Use of soft green grit grinding wheels is made possible in place of costly diamond wheels. Danger of injury to the carbide tool is minimized by the elimination of heat normally generated in grinding. Mr. Chambers was assisted by Mr. A. J. Granata, Pure Carbonic Co., who demonstrated with a portable CO<sub>2</sub> tank. Mr. Granata placed a stream of CO<sub>2</sub> gas on a cutting tool; a formation of frost on the surface was visible in a matter of seconds.

"Soluble Oils" was the topic presented by R. Phoenix, consulting engineer, F. E. Anderson Co. Mr. Phoenix emphasized the superior cooling ability of water and also enumerated the requirements and qualities expected of a good cutting coolant. Recent advances in synthetic bases, EP and rust inhibitors, etc. have extended the application of water-oil emulsions. He stated that solubles used in conjunction with carbides and shear angles have produced highly efficient machining results.

## S. E. Beer Speaks to North Texas Members

Dallas—Members of the North Texas ASTE chapter met in Dallas October 17 for a technical program on "The Latest Developments in the Turning Field." The speaker for the evening was S. E. Beer, distributor sales manager of the Monarch Machine Tool Co., Sidney, Ohio. Mr. Beer's talk was accompanied by movies.

The chapter's annual stage party was held on September 29. A large turnout of approximately 265 members and guests was on hand for the program.



National Director W. B. McClellan (in dark suit) addressed 30 representatives of Albuquerque, Los Alamos, Salt Lake City and Denver ASTE chapters at a Rocky Mountain Executive Conference held September 27. Various programs of the Society, including membership, education, professional engineering, were discussed by the chapter delegates attending the session.

## ASTE Officials Visit Chapter in Windsor

Windsor—Four national representatives of the Society were special guests at the October 20 meeting of the Windsor ASTE chapter. Attending the session were National Director W. B. McClellan, National Standards Chairman R. C. W. Peterson, National Membership Committee Member Dale Burke and Harry E. Conrad, executive secretary of ASTE.

David C. Heath, chairman of the Windsor chapter, called on the visitors for brief speeches. The technical portion of the meeting was handled by the chief engineer of the Cone Automatic Machine Co., Mr. Adams. Augmenting his address with colored slides, he spoke chiefly on Cone Automatic machinery equipment.

## New Haven Members Tour Geometric Tool Co.

New Haven, Conn.—October 10 found some 50 members and guests of the New Haven ASTE chapter touring the Geometric Tool Co., a subsidiary of Greenfield Tap & Die Corp., to see the processes involved in the manufacture of precision die heads, chasers and tapping tools.

After the afternoon tour, members met at the Hotel Garden for dinner and a technical program offered by Geometric Tool Co. Mr. Broderick, sales manager, discussed the new movie made recently by Greenfield Tap and Die Corp. and then presented the first public showing of the film.

Running about a half hour, the movie pictured every phase of threading and tapping with concise explanations on cross sectional views of actual threads being cut.

Important features such as alignment, proper drill sizes and proper placing of the cutting fluid were also stressed.

A talk on the various products made by the firm was delivered by Royce Strickland, chief engineer.

## Des Moines Chapter Enters Fourth Year

Des Moines—More than 50 Des Moines members and guests met October 15 at the Hotel Kirkwood to celebrate the chapter's third anniversary. Ladies' Night was held in conjunction with the commemorative event.

Music provided by organist John Michael accompanied the buffet dinner. Other entertainment included a program by Mrs. Duard Sexton, violinist, and Mrs. Weston Birdsall, pianist.

Two travel films in color were shown to the audience by Glenn Evers, district sales manager of United Air Lines.

The September meeting was held in Newton and featured a tour of the Maytag Company's new automatic washer plant. The two-hour visit was followed by a discussion period, conducted by the plant manager, social hour and dinner.

Technical speaker was David Armbruster of the Maytag Co. He spoke on "Service—Its Relation to Field and Factory." Slides were used to illustrate the talk.

## Tri-City, Cedar Rapids Tour Shaeffer Pen Co.

Ft. Madison, Iowa—A conducted tour of the new plant of the Shaeffer Pen Co. was taken October 8 by more than 70 members of the Tri-City and Cedar Rapids ASTE chapters. The entire manufacturing and research laboratory facilities were visited.

The program began with a noon luncheon in the plant cafeteria and was highlighted by the welcoming address of Milas D. Long, chief tool designer, who was in charge of tour arrangements.

A. V. Howard, works manager of the new plant, conducted an informal question and answer session after the tour. A movie was shown to illustrate the modern methods and equipment used to manufacture pen and pencil sets in comparison with those used in earlier years.

## St. Louis Members Tour Glass Company

St. Louis—One of the most outstanding events ever staged by the St. Louis ASTE chapter took place on October 9 at Alton, Ill., when 327 members toured the Owens Illinois Glass Co. The extensive program was highlighted by a dinner served in the company's club-room auditorium, technical speeches by five Owens Illinois Glass officials, the showing of a color movie and a short ASTE business session.

Cooper White, employment manager, acted as toastmaster and outlined the history and progress of the firm. He emphasized the importance of employee participation in company activities and the company's support of employee activities.

E. Schaefer, chemical engineer, explained the composition of glass and described the furnaces used for melting the raw materials. Samples were used for illustration.

"Duraglass," trade named for products manufactured by Owens Illinois Glass Co., was discussed by Dan

Mahoney. He detailed the specifications required to meet the "end use," such as capacity, strength, dimension, appearance, etc. As a test of strength, he drove a nail through a board with a Duraglass bottle.

The many products, including television tubes, crystal ware, glass blocks and insulators, manufactured by various branches were discussed by K. Schulenburg, service engineer. He explained the operation of the central shops which supply all plants with tools and parts to maintain production equipment.

A color film "Glasstown, U.S.A.," was presented by J. Peipert. It illustrated the complete step-by-step method of manufacturing glass bottles.

Separating into small groups, the chapter was guided through the entire plant where members saw every phase of manufacturing, from furnace to packing, including molding, annealing, gaging, testing, and screening. The facilities for building and maintaining molds and machine parts received particular attention.

## 250 Attend Boston Executives' Night

Boston—Executives' Night of the Boston chapter was held October 9 at New England Mutual Hall. More than 250 members and guests were present for the annual event.

The evening's program was highlighted by the presentation of scholarship awards to two Northeastern University students and a speech delivered by the Honorable Andrew B. Holmstrom, mayor of Worcester, Mass., and vice president of the Norton Co.



Warren Benson



Joseph J. Curran

"The Tool Engineer and Local Government" was Mr. Holmstrom's subject. He covered the different systems of government and told how these systems affected the population of the community.

Dean W. T. Alexander of the School of Engineering, Northeastern University, spoke on the importance of tool engineering. He was introduced by Frank D. Clark who presented the scholarships to Warren E. Benson, Jr. and Joseph J. Curran.

Other special guests included: Edward M. Dowd, Lapointe Machine Tool Co.; Walter E. Mutz, Chelsea Clock Co.; Harold E. Lundstrom, W. H. Nichols Co.; Alfred J. Ferretti, president of Engineering Societies of New England; Ralph I. Robbins, Precision Engineering; Thomas MacLeod, H. F. Livermore Corp.; Leonard Snow, Walemar Engr. Mfg. Co.; and W. G. VanKeuren, The VanKeuren Co.

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When ASTE officers met in North Carolina, they visited a tobacco auction with Piedmont Chairman C. J. Rix. Shown with him are President Bellamy and Treasurer H. C. McMillen.



Those who attended the Friday luncheon at Forsyth Country Club in Winston-Salem included, seated, from left, A. R. Fairchild; G. A. Rogers, assistant secretary-treasurer of the society; President Bellamy and C. W. Zartman. Standing: Henry Newsome, C. J. Rix, Treasurer McMillen, C. W. Reynolds and S. A. Harris.





Lawrence B. Watters, second from right, receives a scholarship award for a four-year course in mechanical engineering at the October 8 meeting of the Syracuse ASTE chapter. Also pictured are, from left: Donald M. Kidd, director of vocational education in Syracuse public schools; H. D. Mozeen, chairman of selection committee and Chairman A. C. Vesper.

## Plant Manager Addresses Indianapolis Audience

Indianapolis.—T. A. Moorman, plant manager, Forging and Casting Div., Allegheny Ludlum Steel Corp., was the technical speaker at the October meeting of the Indianapolis chapter. He spoke on "Tool Steel—Cast to Shape."

"This method," he said, "is finding an ever increasing number of applications. Primarily a method to reduce cost by the purchase of less steel and the reduction of machining time, it has resulted in making possible simpler dies than have previously been made of segmental construction. Longer life, as compared to previous methods, is most often the major saving."

The outstanding characteristics are wear resistance and the high compressive strength, 400,000 psi.

Numerous die applications, cams for automatic machine tools, molds for grinding wheels and other ceramic products, pulverizing blades, rolls, swedges and wear plates are a representative list of uses. Castings have been produced from pieces weighing only a few pounds up to a maximum of 8,000 pounds.

## Discusses Problems in Gear Design, Production

San Diego—The October dinner meeting of the San Diego chapter drew an attendance just short of 100 members, guests and representatives of affiliate members. The audience included many visitors from the American Society for Metals. The October 7 session was held at the El Morocco Club.

Speaker of the evening was Antony Zamis, chief tool engineer, Illinois Tool Works, who discussed problems in production, inspection and design of gears.

## Television Relay Network Explained

North Hollywood, Calif.—Hody's Restaurant was the scene October 1 for the dinner meeting of the San Fernando Valley chapter. C. Corbin Devalon of the Pacific Telephone and Telegraph Co. discussed the role of microwave radio relay as it is employed by the Bell System on some 18,000 channel miles of its intercity television network.

Assisted by Milton Keisner, Mr. Devalon showed how microwaves are beamed like a searchlight in a direct line along a series of relay stations constructed about 30 miles apart.

## Piedmont Members Hear Talk on Cemented Carbides

Charlotte, N. C. — The history and composition of cemented carbides manufactured by Vascoloy-Ramet Co. was the subject covered at the October meeting of the Piedmont chapter. Gathering for dinner and the technical session at the Pecan Grove Club, a large audience heard G. T. Brennan, chief metallurgist, Vascoloy-Ramet. He was introduced by Vice Chairman Neal Dietler.

Mr. Brennan illustrated his lecture with a unique type of sketch pad projector. The discussion period which followed his speech was highlighted by questions on the electrolytic method of sharpening carbide tips and various dye methods of checking carbide for cracks.

A short business session featured announcement of two new appointments. Jim Huntley was named chairman of the education committee and Hank Palmer is now chairman of the editorial board.

## Syracuse Chapter Awards Four-Year Scholarship

Syracuse—A \$1,600 scholarship for a four-year mechanical engineering course was awarded October 8 by the Syracuse ASTE chapter. Recipient of the award is Lawrence B. Watters, 19, a graduate of Smith Technical and Industrial High School. He was chosen for the honor after a series of tests and interviews made with a group of 11 graduates nominated by technical high-school principals through Donald M. Kidd, director of vocational education.

Mr. Watters will enroll in February at Syracuse University. He has been working for the past year and a half in the shop and engineering department of Lipe Rollway Corp.

Serving as chairman of the selection committee was H. D. Mozeen. The scholarship is the first to be awarded by ASTE members of the Syracuse chapter. They plan to continue sponsoring one student at a time by means of such awards.

The presentation, witnessed by 85 members and guests, was made at a dinner meeting and tour of the Lipe Rollway plant. The firm manufactures a variety of products, including heavy automotive clutches, production lathes, automatic magazine loading bar feeds, portable power hack saws and gear tooth chamfering machines.

## Wales Strippit Engineer Talks on Hole Punching

Kansas City, Mo.—ASTE members of the Kansas City chapter heard a technical address on more efficient and economical methods of hole punching and notching at their October meeting. An audience of about 70 members and guests was on hand at Roselli's Restaurant for the program presented by Robert Prochnow, chief engineer, Wales Strippit Corp.

## Williamsport Features Program on Coolants

Williamsport, Pa.—ASTE members held their October meeting at the Anglers' Club. Dinner preceded a technical program conducted by Hayward Gay, vice president of Cincinnati Milling Machine Co. About 80 members and guests were present.

Mr. Gay spoke on coolant developments, coolant applications and the effect of coolants on tool wear and metal removal. Following his talk he showed a movie containing many sequences of the cutting action of tools and how it is affected by coolants.

Floyd Bird, plant manager, Lycoming-Spencer Div., AVCO, was a special guest at the meeting.



## Bellamy, Conrad Guests at Twin States Meeting

Springfield, Vt.—The tremendous growth of ASTE, with 101 chapters and 23,000 members, was cited by President L. B. Bellamy at the October meeting of the Twin States chapter. He stressed the importance of participation in federal, state and local forms of government by tool engineers since few present-day government officials have the necessary engineering background needed to cope with current problems resulting from industrial and scientific advances.

In his talk before 80 members and guests, Executive Secretary Harry E. Conrad discussed the Tool Engineering Research Fund Committee and highlighted some of the actions taken by the ASTE board of directors at the Buffalo semi-annual meeting.

Other honored guests at the meeting were: E. W. Miller, president, Fellows Gear Shaper Co.; Louis Helmick, works manager, Joy Mfg. Co.; Harold Bush, representing W. J. Bryant, Bryant Chucking Grinder Co.; A. L. Gutterson, president Lovejoy Tool Co.; H. H. Whitmore, general manager, Jones & Lamson Machine Co.; and L. M. Davis, assistant chief engineer, Jones & Lamson; and Thomas C. Bradford, ASTE area membership captain, representing the national membership committee.

The technical speaker, Dr. Godfrey Freeman, Rath & Strong, Inc., Boston, discussed the topic of industrial relations. He emphasized the importance of controlling emotions to maintain harmonious human relations in industry and in everyday life. He outlined the evolution of emotions and man's reactions to his emotions to safeguard himself and those with whom he is associated.

In labor-management relationships, Dr. Freeman said the old "dictatorial" and "paternal" systems are being outmoded by the development of administrative and executive training programs by many of the larger industrial organizations. Candidates must be selected who have courage, self-confidence, foresight and a minimum of personal anxiety.

## Golden Gate Members Tour American Can Co.

San Francisco—A tour of the American Can Co. plant in San Francisco was taken by the Golden Gate ASTE chapter at their regular monthly meeting in October. Nearly 200 members and guests were on hand October 15 to see the various high production processes for manufacturing milk containers and tin cans.



Some 80 members and guests of the Twin States chapter were on hand October 15 to greet two Society officials, National President L. B. Bellamy and Executive Secretary Harry E. Conrad. Pictured here, from left, are: George Julien, first vice chairman of the chapter; Mr. Bellamy; L. M. Davis, member of the national editorial committee; and Mr. Conrad.

## Mansfield Speaks to Potomac ASTE Members

Washington, D.C.—The director of welding engineering and research for the Southern Oxygen Co., Roy A. Mansfield, presented the program at the October 2 meeting of the Potomac ASTE chapter. Meeting at the Annapolis Hotel, more than 120 members and guests gathered for the dinner and technical session.

Cautioning that oxyacetylene is still a lively and progressive industrial factor, Mr. Mansfield pointed to many instances where oxyacetylene had succeeded when arc welding had failed. He cited locomotive repair work, economic tool steel hardening and building up oil well drills with welding as specific instances. Flame hardening is a particular instance where success has been achieved.

Other program events included a movie on the invasion of Europe, shown after the lecture. Guests of the Potomac chapter were Capt. C. L. Frazer, manufacturing officer, and Michael K. Morton, production superintendent at the U.S. Naval Gun Factory.

## James Horne Awarded Past Chairman's Pin

Rochester, N.Y.—At the October 6 meeting of the ASTE chapter of Rochester, James Horne received his past chairman's pin from the group's present leader, Charles DeMartin. The award was a highlight of the group's 132nd consecutive meeting.

Technical speaker of the evening was G. F. Hodgson, plant metallurgist for the Doehler-Jarvis Corp. His topic was "Die Castings." Citing the advances made in die-casting techniques resulting from improvements in equipment and in die-casting alloys, Mr. Hodgson used movies to demonstrate the great strides made in the field during the past twenty years.

## Bell System Official Speaks in Toronto

Toronto—"Radio in the Telephone Industry" was the subject discussed at the Toronto chapter's October meeting. Nearly 100 members and their guests met in the Oak Room of the Union Station to hear Harold G. Young, general manager of the Bell Telephone Co. of Canada.

Mr. Young gave a detailed description of how the telephone company went about building a radio network between Buffalo, Toronto and Montreal for transmitting television broadcasts and for increasing long-distance telephone facilities.

During the short business session, the chapter's education chairman, John Lengbridge, presented an outline of the course in die design, sponsored by the group and conducted at the Ryerson Institute of Technology.

## Registered Professional Engineer Act Reviewed

Cleveland—James E. Atchison, director of engineering, Iron Fireman Corp., was the coffee speaker at the October meeting of the Cleveland ASTE chapter. His speech on "Changes in the Registered Professional Engineer Act" was heard by 125 members who attended the dinner meeting at the Hotel Carter.

The technical program was presented by Frederick O. Hutchinson, director of training, DoAll Technical Institute, who gave a lecture on the Model MP-20 Contour-Matic Machine. He demonstrated the various applications of the machines, such as precision sawing, friction cutting, high-speed sawing, parting or severing, line grinding, and diamond sawing.

Following the talk a discussion period was conducted by Manley R. Hanson, general manager, and other representatives from the DoAll Cleveland office.



Contest plans for high school mechanical drawing students in the Rockford, Ill., area were discussed at a recent meeting of the ASTE education committee. Standing, from left: Howard Nelson, Al Sabin of Rockford West High School, Edward Varnum, John Floden and Chester Kastreba. Seated: Richard Kuberka and H. C. Maitland of Rockford West High School, Walter Lewis, William Moreland, first vice chairman of the chapter and Oscar H. Olson of Rockford East High School.

## Lecture Presented on Modern Heat Treating

New York—A paper on "Modern Heat-Treating Practice and Procedures" was presented at the September meeting of the Greater New York chapter held in the grand ballroom of the Hotel New Yorker. Speaker was Fred Heinzelman, Jr., of Heinzelman & Sons, New York.

Mr. Heinzelman outlined the conditions necessary for the proper heat treating of a part, stressing the importance of proper design procedure and the proper selection of steel necessary to do the work.

## ASTE Chapters Tour Ithaca Gun Co.

Ithaca, N.Y.—A joint meeting of the Binghamton and Elmira ASTE chapters was held at the Ithaca Gun Co. on October 6.

More than 250 members and guests participated in the dinner meeting and plant tour.

Arrangements for the tour were made by Harry Howland, factory manager of the firm. He was assisted by company executives and personnel from the various engineering departments.

Tool engineers were present from practically every manufacturing plant in the southern part of New York state and northern Pennsylvania.

Informal speeches were made at the dinner by Raymond Banfield, Elmira chairman; Ed Bates, Elmira first vice chairman; William A. Leindecker, Binghamton chairman; Charles L. King, program chairman; William Evans, Ithaca Gun Co. superintendent; and James Hope, production manager for the Ithaca Gun Co.

## Electrolytic Grinding Portland Program Topic

Portland, Me.—Representatives of the Carborundum Co., Niagara Falls, N. Y., presented the October technical program for members of the Portland ASTE chapter. On hand for the dinner meeting at the Graymore Hotel were J. W. Ripple, sales engineer, and J. W. Wicker, coated products engineer for the New York firm.

Mr. Ripple spoke on electrolytic grinding, explaining all the phases of the very new process. He told the chapter what is going on behind the scenes in experimental laboratories throughout the industry.

Another half hour was devoted to the '61' Contact Wheel as used with coated belts on many operations previously performed with bonded or set-up wheels. With the aid of movies for illustration, this part of the program was conducted by Mr. Wicker.

Guests at the meeting included F. H. Machleit, district manager; A. W. Wilkinson, applications engineer; and H. W. Stuart, sales representative of the Carborundum Co.



Members of the Binghamton and Elmira chapters met October 6 for a plant tour and dinner meeting. Pictured at the speakers' table are: Henry LeMaire, Elmira delegate; Michael Buffalin, Elmira ticket sales chairman; Bill Evans, superintendent of Ithaca Gun Co.; Prof. Earl Brooks, Cornell University; James Hope, production manager of the Ithaca Gun Co. and Raymond Banfield, Elmira chapter chairman.

## Sundstrand Speakers Featured in Montreal

Montreal, Que.—Two technical sessions were offered in October by the ASTE chapter in Montreal. Featuring identical programs, the first was held October 8 at Sherbrooke and repeated on the following evening for an audience at Montreal Technical School.

Speakers were E. W. Dickett and F. L. Suchanek of the Sundstrand Machine Tool Co., Rockford, Ill. The subject for both programs was "Machine Tools and the Tool Engineer."

Mr. Dickett first presented a brief history of the Society and then went on to point out how such small things as centering or chucking of parts can change the whole production picture. Using samples of various parts, he illustrated how tool engineers have overcome machining difficulties and reduced the number of operations.

Mr. Suchanek spoke on magnetic chucks, giving a detailed demonstration on a small chuck. Two films were included on the program.

In September Montreal members held their golf tournament at Lachine Country Club. Some 60 members and guests participated and more than 100 attended the dinner which followed.

## Atlanta Speaker Reviews Controlled Air Power

Atlanta—Harold Lamb, assistant regional sales manager, The Bellows Co., Akron, Ohio, addressed the October meeting of the Atlanta ASTE chapter on the topic, "Controlled Air Power." He treated the various aspects and advantages of air-hydraulic controls and their applications to machine tool use. The inherent features of air-hydraulic controls, such as ease of operation, positivity of action, accuracy and speed were emphasized.

A film entitled "Production Miracles" that followed the same theme as the lecture was presented to the group.

The chapter's current membership campaign is in full swing and efforts are being directed toward making the goal of 100 members a reality.



A scoreboard for keeping posted on progress of the Long Beach ASTE chapter's current membership campaign was a highlight of the October technical meeting. Each member who sponsors one new member is listed in the "show" column. When three new members are brought into the chapter, the sponsoring member's name is placed in the "place" column. For the fifth new member the sponsor's name will be advanced to the "win" column. Prizes are being offered as additional incentives and grand prizes will be awarded to the three men who sign up the greatest number of new members by the January 14 deadline.

## Colonial Broach Gives New Orleans Program

New Orleans—Guest speaker at the New Orleans October meeting was Harry H. Gotberg, vice president of Colonial Broach Co., Detroit, Mich. Before his scheduled talk on the subject of broaching, Mr. Gotberg gave a brief resume of his experiences during a recent European trip, which included visits at the Citroen and Renault plants in Paris, a jet engine manufacturing plant in London, a machine tool show in the same city, and the machine tool exhibit at the trade fair in Hanover, Germany, also various plants in Sweden.

Mr. Gotberg's introduction to his general subject outlined the advanced methods being employed to meet specific production problems. He gave a description of the tools manufactured by his firm.

Colored movies illustrated the talk, showing machines in actual operation with broaching attachments producing parts of all shapes and sizes. The progress which has been made in this field was described from the crude manual method, through hand-operated tools, to the present-day multiple machines, microactivated and with mechanical controls almost human in their detailed operation. A question and answer period followed.

The meeting highlighted the current series of programs arranged by John Sale, program chairman.

## Production Control Discussed by John Eaton

Allentown, Pa.—About 65 members of the Lehigh Valley ASTE chapter met in the Sky Terrace Room of the Hotel Traylor for the October dinner meeting and technical session. Among the guests were Werner O. Miller, chief tool engineer, and several other representatives from the Textile Machine Works, Reading, Pa.

The program was presented by John Eaton, chief engineer, Sarco Mfg. Co., Bethlehem, Pa., and program chairman of the Lehigh Valley chapter. He spoke on new method of production control, developed by Sarco engineers, which utilizes standard accounting machines to control the parts and material inventories for some 80,000 catalog items.

## Reviews Recent Advances in Tool Die Welding

Poughkeepsie, N.Y.—Mid-Hudson members held their first meeting following the summer vacation on October 14 at the Nelson House. Attended by approximately 80 members and guests, the technical session featured a talk by Woodrow W. Shackelford, regional manager of the Eutectic Welding Alloys Corp. He spoke on "Latest Advances in Tool and Die Welding."

Pointing out that due to the intricate construction and high cost of dies and other major tools, Mr. Shackelford said a considerable saving in both time and money is realized by repairing broken tools rather than making new. Since there are different types of welding rods for the hot work, oil, air and water hardening tool steels, the kind of material to be repaired must first be determined. The crack to be repaired must be entirely visible either by magnaflux inspection, magnifying glass or Dy-check.

Prior to welding, the tool to be repaired must be preheated to a specified temperature, depending on the type of steel, namely 300-400 for oil hardening steels, 600-900 for air hardening steels, 700-900 for hot work steels and 250-400 for water hardening steels.

At the conclusion of his talk, Mr. Shackelford showed slide pictures of various types of dies and cutting tools repaired by the welding method.

Preceding the technical talk, Allen Rappleyea related his experiences and impressions during his stay with a family in Germany for seven weeks during this past summer. Mr. Rappleyea's trip was sponsored by the Poughkeepsie Junior Chamber of Commerce in conjunction with local industries, organizations and private sources.

During the business meeting, a report on the ASTE semi annual meeting at Buffalo was given by Joseph A. Petz, past chapter chairman and a member of the national editorial committee.



Shown at the October meeting of the ASTE chapter in New Orleans are: Ed Graf, secretary; John Sale, program chairman; Harry Gotberg, vice president of the Colonial Broach Co., Detroit; L. C. McKinley, first vice chairman; James R. Cypher, chairman of the chapter; and Bert Ryan, treasurer of the organization.





"Controlled Air Power" was the topic discussed by Harold Lamb, assistant regional sales manager for the Bellows Co., Akron, Ohio, when he addressed members of the Atlanta ASTE chapter. He treated the various aspects and advantages of air-hydraulic controls and their applications to machine tool use. Pictured with Mr. Lamb at the technical session, standing in the back, is Sidney B. Ehrlich, local representative with the Bellows Co.

## Los Angeles Plans Extension Course at UCLA

Los Angeles—Patterned after the first college course sponsored last year by the Los Angeles ASTE chapter, another technical program of vital interest to tool engineers is being planned by the ASTE education committee and the extension division of the University of California at Los Angeles.

The evening course will be given next spring for men who are occupied full time within the industry to study in their free time and eventually obtain a university degree. Another goal in offering the program is to help alleviate the shortage of trained engineers for defense and commercial activities.

The 1952 course, "Tooling and Production of Jet Engines and Turbo Ma-

chinery," was under the supervision of Education Chairman S. W. Winquist, manufacturing engineer with Propulsion Research Corp. He lectured on design and operation of the jet engine.

Other speakers, selected from men within the industry, were: C. C. Haynie, staff assistant to director of instrument engineering, Special Weapons Div., Northrop Aircraft; P. R. Burt, chief engineer, Arrowsmith Tool & Die Co.; A. G. Anderson, inspection chief, Propulsion Research Corp.; C. H. Paul, project engineer on turbines, AiResearch Mfg. Corp.; H. W. Young, general plant superintendent, AiResearch Mfg. Corp.; H. E. Foster, supervisor of production engineering, AiResearch; O. O. Weber, partner, Coast Metal Craft; and M. L. Gordon, staff assistant to manufacturing manager, AiResearch.

They covered blades, punch press dies, investment castings, design, economical mass production, special tooling, tooling and spinning, and centrifugal investment castings.

**Tours to Arrowsmith Tool & Die Co., Turbo Jet Product, Modern Tooling Co., Ace Stamp & Stencil Co. and AiResearch Mfg. Corp. (pictured below) were included so students might see the methods and applications firsthand.**



## ASTE Speaker Discusses Bellows Air Devices

Herkimer, N.Y.—A descriptive talk on the construction and operation of the different air devices manufactured by the Bellows Co., Akron, Ohio, was given at the September 23rd meeting of the Mohawk Valley ASTE chapter. The dinner meeting, held at the Palmer House, was attended by more than 50 members and guests.

Program speaker was Harold W. Lamb, assistant regional manager, Boston, who also showed two sound films illustrating many types of installations and tooling applications. A stimulating question and answer period followed the speech.

Guests at the meeting included W. R. Jessup and Walter Buell, field engineers with the Bellows Co.

The chapter's October meeting was held at Brassel's in Utica. Dinner preceded the technical session which featured the topic "The Multipress and How You Can Use It." A sales manager for the Denison Engineering Company of Columbus, Ohio, Robert H. Krepps discussed the application of tooling and production and production procedures on hydraulic press operations. Two sound films were shown portraying the Multipress and indexing table at work in various industries and described their features and operating characteristics.

### Position Available

**HYDRAULIC ENGINEER**—Excellent opportunity now exists in our valve and cylinder divisions for an experienced hydraulic engineer.

Opportunity to head the engineering of the division including development and design of new projects. Experience in valve design imperative. Reply giving education, work experience and salary desired. Albert Hunt, Vice President, Rivett Lathe & Grinder, Inc., 18 Riverview Rd., Brighton 35, Boston, Mass.



## Cincinnati Members Tour Thatcher Glass Mfg. Co.

Cincinnati—A highly productive glass bottle plant of the Thatcher Glass Manufacturing Co. was toured October 21 by the Cincinnati ASTE chapter. More than 50 members and guests made the trip to Lawrenceburg, Ind. for the visitation.

Operations at the plant center about the only glass furnace in the United States which employs the regenerative principle of heating similar to that of the open hearth steel furnace. It is one of the few furnaces in which all phases of operation such as charging, firing and combustion control and tapping are automatically controlled.

Opened in 1950, the plant has a production capacity of some 400,000 beverage bottles per day. The ASTE visitors were particularly impressed by the almost human performance of the automatic molding machines which transform a slug of molten glass into a shining bottle in approximately ten seconds. Only in the final inspection and packaging are the bottles handled by workmen.

The tour was arranged by Richard Niebusch, chapter program chairman.

## Richmond Members Hear About Shell Molding

Richmond, Ind.—"The Shell Molding Process—Its Advantages and Disadvantages" was the subject of a talk by Roger A. Dull, project engineer for the Perfect Circle Corp., Hagerstown, when he spoke before 67 members of the Richmond chapter at a dinner meeting in the Connersville YMCA on October 13.

Mr. Dull showed molds, cores and castings of several sizes and shapes in addition to describing in detail the different ways of making cores and molds and the advantages and disadvantages of shell molding.

## Manager Appointed

William F. Tyson, a past chairman of the Windsor ASTE chapter, has been appointed plant manager of Plant 4, Ford of Canada. Mr. Tyson has been an assistant plant superintendent since 1951 and has also served in a number of production positions.

## Named Vice President

Arthur W. Kurz, Jr., Detroit ASTE member, has been appointed vice president of the Hunt Loom & Machine Works of Greenville, S. C. In his new position Mr. Kurz will serve as assistant to the president. He was formerly chief engineer of the Dolphyn Engineering Corp., Detroit.



Featured speaker at the September meeting of the ASTE chapter in Denver was Wendell F. Carney (second from right), Taft-Peirce Mfg. Co., who presented a discussion and slides on production of air gages. Shown with Mr. Carney at the technical session, from left, are: Norval Allen, chapter secretary; Clint Helton, first vice chairman; Alex Wilcox, program chairman; and F. J. Geoffroy, chairman of the Denver chapter.

## Stresses Coordination of Engineering Departments

Garden City, Long Island—Thirty guests, including 15 methods engineers from Republic Aviation Corp., attended the October 13 meeting of the Long Island chapter. The session was held at the Garden City Hotel.

"Coordination of Methods Engineering and Tool Engineering" was the subject of a talk delivered by Norris M. Perris, senior partner, Stevenson, Jordon & Harrison, Inc., New York City.



Pictured at the October meeting of the Long Island chapter are, from left: Carl Kertesz, William Rogers and Norris M. Perris, speaker at the evening's technical session.

He stressed the importance of separation of design, methods and tool engineering in increasing production. Scheduling, handling and flow of materials to the production line for constant efficiency of man hours and tool hours were noted along with proper tooling. Mr. Perris cited many pertinent illustrations of actual conditions relative to these problems.

An animated question and answer period concluded the technical program.

Carl Kertesz of the national membership committee spoke briefly to the chapter on the work of his ASTE committee.

## Fairfield County Members Mark Tenth Anniversary

Bridgeport, Conn.—National Director Thomas J. Donovan, Jr. was an honored guest at the tenth anniversary meeting of the Fairfield County ASTE chapter held on September 16 at the Stratfield Hotel. Other guests were past chairmen of the chapter and current chairmen of other engineering groups.

Principal speaker of the evening was A. H. d'Arcambal, vice president, Pratt and Whitney Div., Niles-Bement-Pond, West Hartford, Conn., and a past president of the Society. Discussing "Thirty Years of Metallurgy," Mr. d'Arcambal compared the number of tool steels available today with the relatively small number available many years ago. He placed emphasis on the economical importance of applying the right steel to the right job. In many cases a cheaper tool steel will do a job just as well as one that is more expensive.

Growth of metallurgy at Pratt and Whitney and the tremendous amount of research was also discussed by Mr. d'Arcambal.

The coffee talk was delivered by Arthur F. Murray, works manager, Electrolux Corp., Old Greenwich, Conn., who gave some historical aspects of tool engineering.

## Zamis Addresses 165 Los Angeles Members

Los Angeles.—Speaker at the October meeting of the Los Angeles chapter was Anthony Zamis, chief engineer, Illinois Tool Works. More than 165 ASTE members were present for the dinner meeting and technical session held at Scully's Restaurant. Mr. Zamis spoke on "Production, Inspection and Design of Gears for Critical Applications."

## News Notes from the West Coast

By Andrew E. Rylander

From one thing to another, had my first experience with an earthquake. It really rattled things around. Thinking a truck or something had hit the house, I ran out to find the neighbors also looking around. Not sure of what it was, the lawyer across the road opined that it was the preliminary rumble of a Republican landslide.

October found me a year closer to retirement age, as if I had any intention of retiring. I'll wait until I'm an old man for that.

Lapointe Machine Tool's 50th Anniversary brochure—"Life Was Like That Before Broaching," is full of interesting information on earlier days and includes a swell pic of ASTE Veeep Joe Crosby and his running mates at Lapointe. Come to think of it, I broached keyways with a Lapointe machine back in '06, barely three years after the machines were introduced.

The plant tour meeting of Golden Gate chapter, October 15, at the American Can Company's San Francisco plant stands out as one of the most interesting I've so far attended. An overflow attendance taxed the capacity of the cafeteria, so we had to eat in relays.

Having had something to do with tooling for can making in the early days, I was struck with both the progress in equipment and the speed at which it turned out cans of every description. Brrrrt!—and a coffee can is rolled from a strip and shunted past automatic soldering. Just can't believe that there are Swedes enough in Minnesota or Germans in Wisconsin to drink all the coffee contained in those cans.

Santa Clara Valley's October meeting, held at Longbarn, Palo Alto, featured a talk on "Tool & Die Salvage Welding" by Mr. Rasmussen of Eutectic Welding Alloys Corp. I find myself quite impressed with the meetings bulletins of Santa Clara Valley chapter. If future progress is on a par with a good start, this chapter promises to become a force in the ASTE family.

Well, the holidays are approaching and so once again, at least, I can wish you boys—girl ASTEers too, for that matter—my very best wishes for the Season.

May the time come again we can enjoy a Yuletide without thought of wars or preparedness for wars, "when the lights go on again all over the world." With that, to members and friends North, East, West, South, a Merry Christmas and a Happy New Year.

## Coming MEETINGS

CHICAGO—Dec. 1, Keymans Club. "Recent Developments in Cutting Tools" by W. R. Frazer, Union Twist Drill Co., Athol, Mass.

CLEVELAND—Dec. 13, Rainbow Room Hotel Carter, annual Christmas party.

DETROIT—Dec. 4, Carbide Section, "Selection and Application of Carbides." December 11, annual Christmas stag party.

GRAND RIVER VALLEY—Dec. 5, Plant tour, Modern Welding, Galt.

GRANITE STATE—Dec. 9, "Automatic Screw Machines" by Deming S. Cross, Brown & Sharpe Mfg. Co., Providence, R.I.

HARTFORD—Dec. 1, 6 p.m., "Education Night" at City Club and State Technical School. "State Technical Schools, Their Progress and Future" by Dr. Engleman, commissioner of education of state of Connecticut.

GREATER NEW YORK—Dec. 8, Program on die castings presented by H. W. Van Dyke, plant metallurgist, Pottstown Div., Doehler-Jarvis Corp., Toledo, Ohio.

LITTLE RHODY—Dec. 13, Vilmoray Restaurant, annual Christmas party.

LONG BEACH—Dec. 12, Lakewood Country Club, Christmas dinner dance.

LONG ISLAND—Dec. 8, 8:30 p.m., Garden City Hotel. "Molded Laminate Tooling" by Lawrence Wittman, vice president, Cordo Molding Products, Inc., New York, N.Y.

MILWAUKEE—Dec. 11, American Serb Memorial Hall. "Uses Unlimited"

by Nick Kouzmanoff and Kenneth W. Wood, Micro Switch, Freeport, Ill.

NEW HAVEN—Dec. 11, New Haven Country Club, annual Christmas party.

PETERSBOROUGH—Dec. 4, 6 p.m., Empress Hotel. "Metal Spinning" by John Lengbridge, Aluminum Goods Ltd.

PITTSBURGH—Dec. 5, 6:30 p.m., Sheraton Hotel, Christmas stag party.

PORTLAND (ME.)—Dec. 12, 7 p.m., Graymore Hotel. Sound film presented on "Machine Knives in Industry, sponsored by Simonds Saw & Steel Co., Fitchburg, Mass.

POTOMAC—Dec. 4, 6:30, Hamilton Hotel. "Quality Control" by Comdr. W. W. Kaufman, U.S. Naval Gun Factory, Washington, D. C.

ST. LOUIS—Dec. 4, 6:30 p.m., DeSoto Hotel. "Drilling of Holes and Drill Press Design" by John Edgemont, Magna Engrg. Corp., Menlo Park, Calif.

TOLEDO—Dec. 10, "A Method of Reasoning for Tool Design" by J. I. Karash, Reliance Electric and Engrg. Co., Cleveland.

TRI-CITY—Dec. 13, 6:30 p.m., Marando's Club, Milan, Ill. Ladies' Night.

TWIN CITIES—Dec. 3, Precision Night. Program on duplication and pantograph work by representative of George Gorton Machine Co.

TWIN STATES—Dec. 10, Windsor House, Windsor, Vt. "Simplified Drafting" by W. L. Healy, General Electric Co. Film on "From Iron Ore to Motive Power."



Informality and a wide variety of activities keyed the annual clam bake staged by the members of the Twin States ASTE chapter early this autumn. With a three-year seniority at manning the refreshment tables, Stanley Krasofski and Lawrence Pulsipher showed their experienced hands at the job again this year.

## Directory of ASTE Chapter Chairmen

**AKRON No. 47**  
Third Tuesday  
Alvin Orvis Hunt, 124 N. Har-  
mon St., Medina, O.

**ALBUQUERQUE No. 93**  
First Friday  
Jerome F. Durrie, 3350 48th Loop,  
San Jose Base, Albuquerque, N. M.

**ATLANTA No. 61**  
Third Monday  
Frank Frost Ford, 67 The Prado,  
N.E. Atlanta 5, Ga.

**BALTIMORE No. 13**  
First Wednesday  
Leon E. Laux, 900 E. Fairway Dr.,  
Towson 4, Md.

**BINGHAMTON No. 35**  
First Wednesday  
William A. Leindecker, 42 Orchard  
Ave., Johnson City, N.Y.

**BOSTON No. 33**  
Second Thursday  
Harold L. Seekins, 17 Ridge Rd.,  
Marblehead, Mass.

**BUFFALO-NIAGARA No. 10**  
Second Thursday  
William L. Clarke, Ex-Cell-O Corp.,  
923 Kensington Ave., Buffalo 15,  
N.Y.

**CEDAR RAPIDS No. 71**  
Third Wednesday  
Edwin Klouda, Sixth & Prairie  
Aves., S.W., Cedar Rapids, Iowa

**CENTRAL PENNSYLVANIA No. 22**  
First Monday  
Burnell C. Stambaugh, Hanover  
Tool & Specialty Works, 449 York  
St., Hanover, Pa.

**CHICAGO No. 5**  
Second Tuesday  
H. Verne Loeppert, 9925 Karlov  
Ave., Skokie, Ill.

**CINCINNATI No. 21**  
Second Tuesday  
Joseph Aprile, 3715 Brotherton  
Rd., Cincinnati 9, O.

**CLEVELAND No. 3**  
Second Friday  
A. B. Clark, Haynes Stellite Co.,  
1517 Superior Ave., Cleveland 14,  
Ohio

**COLUMBUS No. 36**  
Second Wednesday  
Jack E. Mitchell, 344 South Brink-  
er Ave., Columbus 4, O.

**DAYTON No. 18**  
Second Monday  
Richard M. Blair, 7406 Harry  
Truman Dr., Dayton 3, O.

**DECATUR No. 58**  
Next to Last Thursday  
Fred W. Sobotta, 1620 1/2 E.  
Cleveland, Decatur, Ill.

**DENVER No. 77**  
First Wednesday  
F. J. Geoffroy, The Geoffroy Co.,  
P.O. Box 67, Capitol Hill Sta.,  
Denver 6, Colo.

**DES MOINES No. 80**  
Third Wednesday  
Howard E. Campbell, 2733 Adams  
Ave., Des Moines 10, Iowa

**DETROIT No. 1**  
Second Thursday  
Edward D. Wiard, Illinois Tool  
Works, 2895 E. Grand Blvd.,  
Detroit 2, Mich.

**ELMIRA No. 24**  
First Monday  
Raymond F. Banfield, 134 Catalpa  
Dr., Horseheads, N.Y.

**ERIE No. 62**  
First Tuesday  
Walter S. Cebelinski, 320 East 31st  
St., Erie, Pa.

**EVANSVILLE No. 73**  
Second Monday  
Henry J. Pernicka, 4617 Taylor  
Ave., Evansville, Ind.

**FAIRFIELD COUNTY No. 6**  
First Wednesday  
Mason B. Whiting, Box 12, Red-  
ding Ridge, Conn.

**FOND DU LAC No. 45**  
Second Friday  
Paul V. Rohling, Vollrath Co.,  
1236 N. 18th St., Sheboygan, Wis.

**FORT WAYNE No. 56**  
Second Wednesday  
Everett R. Keese, Bowser, Inc.,  
1302 E. Creighton Ave., Fort  
Wayne 2, Ind.

**FOX RIVER VALLEY No. 72**  
First Tuesday  
George R. Parsons, 486 Ann St.,  
Elgin, Ill.

**GOLDEN GATE No. 28**  
Third Wednesday  
Ted J. Rohrer, Pratt & Whitney  
Div. 1331 Howard St., San Fran-  
cisco 3, Calif.

**GRAND RIVER VALLEY No. 81**  
First Friday  
David E. McCready, 19 St. Arnaud  
St., Guelph, Ont., Canada

**GRANITE STATE No. 86**  
Second Tuesday  
James David Wilson, 18 Caris-  
brooke St., Andover, Mass.

**HAMILTON No. 42**  
Second Friday  
William McKee Shaw, 9 Harrison  
Ave., Guelph, Ont., Canada

**HARTFORD No. 7**  
First Monday  
Henry E. Kuryla Norden Instru-  
ments, Inc., Wiley St., Milford,  
Conn.

**HOUSTON No. 29**  
Second Tuesday  
George L. Freeman, Steel & Ma-  
chine Tool Sls. Co., P.O. Box 1716,  
Houston 1, Texas

**INDIANAPOLIS No. 37**  
First Thursday  
Denis F. White, 1222 E. New York  
St., Indianapolis 2, Ind.

**JACKSON No. 87**  
Third Monday  
Edwin G. Small, Dawlen Corp.,  
1911 Fargo Rd., Jackson, Mich.

**KANSAS CITY No. 57**  
First Wednesday  
John W. Hoover, 3212 Jefferson  
St., Kansas City 2, Mo.

**KEYSTONE No. 101**  
Jack Lipman, 439 North Irving  
Ave., Scranton, Pa.

**LACROSSE No. 96**  
Fourth Tuesday  
John David Holly, 220 1/2 19th St.,  
LaCrosse, Wis.

**LANCASTER, GREATER No. 89**  
Second Tuesday  
Willis M. Houck, 54 Union St.,  
New Holland, Pa.

**LEHIGH VALLEY No. 83**  
Third Friday  
John Eaton, 408 North 26th St.,  
Allentown, Pa.

**LIMA No. 97**  
Third Thursday  
R. J. Schimpf, 842 W. Elm, Lima,  
Ohio

**LITTLE RHODY No. 53**  
First Thursday  
Matthew J. Grochmal, 82 Bryant  
St., No. Dartmouth, Mass.

**LONDON-ST. THOMAS & DIST. No. 91**  
Third Thursday  
Albert H. Ward, 48 Apeldoorn  
Crescent, London, Ont., Canada

**LONG BEACH No. 84**  
Second Wednesday  
Frank D. Wallace, 2906 Petaluma  
Ave., Long Beach 4, Calif.

**LONG ISLAND No. 88**  
Second Monday  
William W. Rogers, L. I. Agr. &  
Tech. Inst., 520 Conklin St.,  
Farmingdale, L. I., N.Y.

**LOS ALAMOS No. 92**  
1st Thursday after 1st Wednesday  
Norman C. Blezck, 3226-A Walnut  
St., Los Alamos, N. M.

**LOS ANGELES No. 27**  
Second Thursday  
Ralph Louis Chrissie, Hollywood  
Mfg. & Sup. Corp., 720 Towne  
Ave., Los Angeles 21, Calif.

**LOUISVILLE No. 54**  
Second Tuesday  
Robert F. Stucker, 3211 Oriole  
Drive, Louisville 13, Ky.

**MADISON No. 75**  
Second Tuesday  
Charles W. Neff, 2321 Kendall  
Ave., Madison 5, Wis.

**MID HUDSON No. 74**  
Second Tuesday  
Joseph A. Crane, Int'l Business  
Mach. Corp., Engineering Labora-  
tory, Box 390, Poughkeepsie, N.Y.

**MILWAUKEE No. 4**  
Second Thursday  
Waldemar E. Klein, 7624 West  
Walker St., Milwaukee 14, Wis.

**MOHAWK VALLEY No. 78**  
Fourth Tuesday  
Albert Charles Delmont, 812  
Arnold Ave., Utica 2, N.Y.

**MONTREAL No. 50**  
Second Thursday  
Creighton Joseph McDowell, 5020  
Randall Ave., Montreal 29, Que.,  
Canada

**MUNCIE No. 70**  
First Tuesday  
Lake Lavon Deane, 2005 S. Hack-  
ley, Muncie, Ind.

**NASHVILLE No. 43**  
Third Tuesday  
John W. Gipson, 610 Shady Lane,  
Nashville 6, Tenn.

**NEW HAVEN No. 41**  
Second Thursday  
John H. Altton, Eastern Machine  
Screw Corp., Truman & Barclay  
Sts., New Haven 10, Conn.

**NEW ORLEANS No. 60**  
First Tuesday  
James R. Cypher, Chrysler Corp.,  
P.O. Box 460, New Orleans, La.

**NEW YORK, GREATER No. 34**  
First Monday  
Eugene Roth, Eugene Roth Co.,  
Inc., 250 West 57th St., New  
York 19, N.Y.

**NIAGARA DISTRICT No. 65**  
First Thursday  
John Michael Marchyn, Tri-Sure  
Prod. Ltd., 264 Welland Ave.,  
St. Catharines, Ont., Canada

**NORTHERN MASSACHUSETTS  
No. 100**  
Third Tuesday  
William R. Frazer, 66 Newton St.,  
Athol, Mass.

**NORTH TEXAS No. 51**  
Second Friday  
Arnold E. Unruh, 708 Roberts  
Cutoff, Fort Worth 14, Tex.

**NO. NEW JERSEY No. 14**  
Second Tuesday  
Clyde C. Shannon, 1508 Burnett  
Ave., Union, N.J.

**PEORIA No. 31**  
First Tuesday  
William H. Logue, 3018 Springfield  
Rd., E. Peoria 8, Ill.

**PETERBOROUGH No. 94**  
First Thursday  
Robert R. Dyer, 247 Wilson,  
Peterborough, Ont., Canada.

**PHILADELPHIA No. 15**  
Third Thursday  
Albert B. Luccke, 622 Boyer Rd.,  
Cheltenham, Pa.

**PIEDMONT No. 82**  
Second Monday  
Charles J. Rix, 828 Melrose St.,  
Winston, Salem, N.C.

**PITTSBURGH No. 8**  
First Friday  
Fred Hennig, Jr., Kennametal, Inc.,  
600 Grant St., Pittsburgh 19, Pa.

**PONTIAC No. 69**  
Third Monday  
Ronald J. Hayward, 231 Starr St.,  
Pontiac 18, Mich.

**PORTLAND, ME. No. 46**  
Second Friday  
John J. Green, Thomas Laughlin  
Co., 143 Fore St., Portland 6,  
Me.

**PORTLAND, ORE. No. 63**  
Third Thursday  
Daniel J. Melody, 4727 N. E. 74  
Ave., Portland 13, Ore.

**POTOMAC No. 48**  
First Thursday  
William E. Jones, U.S. Naval Gun  
Factory, 8th & M. Sts., S.E.,  
Washington, D.C.

**RACINE No. 2**  
First Monday  
John George Obermeyer, R. 3, Box  
176, Racine, Wis.

**RICHMOND No. 66**  
Second Tuesday  
James C. Brindell, 408 So. 23rd  
St., Richmond, Ind.

**ROCHESTER No. 16**  
First Monday  
Charles L. DeMartin, General  
Screw Products Corp., 63 Mt. Hope  
Ave., Rochester, N.Y.

**ROCKFORD No. 12**  
Third Thursday  
Bruce H. Lundgren, Sundstrand  
Machine Tool, 2531 11th St.,  
Rockford, Ill.

**SAGINAW VALLEY No. 68**  
Third Thursday  
Clyde L. Fanning, 3128 Norwood  
Dr., Flint 4, Mich.

**SAN GABRIEL VALLEY No. 95**  
First Thursday  
Edw. A. Smith, Day & Night Mfg.  
Co., 700 Royal Oaks, Monrovia,  
Calif.

**ST. LOUIS No. 17**  
First Thursday  
Erwin Paul Huchzermier, 4934  
Miami St., St. Louis 9, Mo.

**SALT LAKE CITY No. 85**  
1st Friday after 1st Wednesday  
John F. Woodhead, 2477 Skyline  
Dr., Salt Lake City 5, Utah

**SAN DIEGO No. 44**  
Second Tuesday  
Arthur E. Crom, 1759 Oliver Ave.,  
San Diego 9, Calif.

**SCHENECTADY No. 20**  
Second Thursday  
A. Edmund Lee, Box 1151, Scotia  
2, N.Y.

**SEATTLE No. 39**  
Fourth Tuesday  
A. J. Gembois, 4501 Greenwood  
Ave., Seattle 3, Wash.

**SOUTH BEND No. 30**  
Second Tuesday  
Lawrence Haverstock, 2515 Misha-  
waka Ave., South Bend 15, Ind.

**SPRINGFIELD, ILL. No. 64**  
First Tuesday  
Robert C. Peek, 541 South Lin-  
coln, Springfield, Ill.

**SPRINGFIELD, MASS. No. 32**  
Second Monday  
William F. Buckley, 142 Chapin  
Terr., Springfield, Mass.

**SPRINGFIELD, OHIO No. 76**  
Second Tuesday  
Kenneth A. Forsell, 324 Ogden  
Rd., Springfield, O.

**SYRACUSE No. 19**  
Second Tuesday  
Albert C. Vesper, 419 Durston  
Ave., Syracuse 6, N.Y.

**TOLEDO No. 9**  
Second and fourth Wednesday  
Elmer L. Faber, 4162 Berwick,  
Toledo 12, O.

**TORONTO No. 26**  
First Wednesday  
Fred J. E. Lockhart, Atlas Steels  
Ltd., 30 Ordinance St., Toronto,  
Ont., Canada

**TRI-CITIES No. 23**  
Second Wednesday  
Gilbert H. Jording, 2015 42nd St.,  
Rock Island, Ill.

**TULSA No. 90**  
Second Thursday  
John H. Keyes, 1342 South Nor-  
folk, Tulsa 14, Okla.

**TWIN CITIES No. 11**  
First Wednesday  
Don Reiner, 5328 Bloomington, So.  
Minneapolis 7, Minn.

**TWIN STATES No. 40**  
Second Wednesday  
George Julien, Jones & Lamson  
Machine Co., 160 Clinton St.,  
Springfield, Vt.

**WATERLOO AREA No. 79**  
Fourth Wednesday  
David D. Lowber, 1321 Brooklyn  
Ave., Ann Arbor, Mich.

**WESTERN MICHIGAN No. 38**  
Second Monday  
Robert J. Maguire, Good Steel  
Service, Inc., 1010 Leonard St.,  
N. W., Grand Rapids, Mich.

**WICHITA No. 52**  
Second Wednesday  
Orville B. Strahm, 601 S. Terrace  
Dr., Wichita 9, Kans.

**WILLIAMSPORT No. 49**  
Second Monday  
Morris C. Smith, 198 Broad St.,  
Montoursville 1, Pa. (Williams-  
port)

**WINDSOR No. 55**  
Second Monday  
David C. Heath, 460 Sunset Ave.,  
Windsor, Ont., Canada

**WORCESTER No. 25**  
First Tuesday  
E. Roland Ljungquist, 37 Winifred  
Ave., Worcester 5, Mass.



# News in Metalworking . . .

## SIMPLIFIED SETUP FOR GAGE BLOCK USE IN PRODUCTION LINE GAGING

With the emphasis placed today on precision work, the accuracy achieved through gage blocks is becoming as important in the turning out of the end product as it is in the production of the original tools. However, the difficulties involved in assembling the gage blocks into a practical measuring tool for everyday checking have usually resulted in their being locked up after initial use, and less accurate instruments substituted for production details.

As a result of this situation existing in industry, The DoAll Co. has come up, after considerable research, with a series of gaging items designed to speed up construction of gaging setups with U.S.A. type gage blocks which at the same time offers realization of greater utility from the blocks by permitting construction of instruments for any gaging or scribing operation.

Nucleus of the system, known as Micro-Step gaging, is a series of gage block holders and "end standards".



Checking the distance between milling cutters. The exposed ends of gages assembled from the system, offer distinct gaging advantages.

These permit setups up to 72 in. long for one single complete set of holders, in increments of as little as 0.000025 in. By assembling additional holders, even longer setups can be obtained. Since they incorporate working surfaces needed for constructing measuring instruments—their dimensions with gage block tolerance are known—the end standards may be considered functional gage blocks. Two main points are of interest here: the simplicity with which the holders, end standards and gage blocks can be assembled, and the fact the end standards can be fastened directly at the ends of the holders to present a full, uninterrupted surface beyond the ends of the holders. This latter point is particularly important,

for it eliminates end obstructions usually created by mechanical fittings used for gage blocks. These end obstructions may limit the variety of gages that may be constructed. For example, a pin gage for checking deep bores must penetrate the gaging surfaces into the bore and would be handicapped by such an obstruction.

Holders in the DoAll system are comprised of channel type holders in graduated sizes which, in a single set, embrace collectively a usable measuring range of from 2 to 72 inches; one caliper holder (1- to 6-in. range) for outside and inside calipers, dividers or scribing compass and many other balanced assemblies are included in the set. A channel type holder consists of a channel extension and a base holder. To form a complete holder, an extension is slipped into the base holder. A variety of sizes of extensions and base holders permit a broad measuring range.

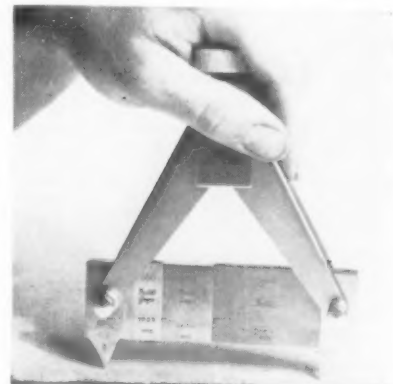
To assemble the gages, a captive type pin is employed at each end of every extension and base holder, and the end standards are drilled to the diameter of this pin. The end standard is attached by inserting it in the holder at the desired end and aligning its hole with the detent pin hole. The detent pin is pressed through the end standard to the opposite wall of the holder where it snaps into a lock bushing. Gage blocks required to complete the desired dimension between the working surfaces of the end standards are slipped into the holder and the entire assembly is clamped together with the thumb screw mechanisms at the sides of the holder. The detent pin assures positive



Showing versatility of the system, here an operator uses a large indicating snap gage with pre-calibrated dial indicator (an end standard), extra long gage blocks and a long holder.

contact between the components of the gage and rigidity of the entire assembly. To clamp together the blocks and standards in a holder, the channel extension is drawn into the base holder by means of the thumb screws at the sides of the base holder. The thumb screws are on L-ended threaded rods and the L-ends of these rods hook into holes in the side of the channel extension. When the rods are drawn down by the thumb screws, the extension is drawn down also into the base holder.

With this arrangement, the blocks in the holder are pressed together between the end standards. Because the end



Caliper holder for assemblies up to 6-in. long, is balanced for many setups, particularly for compass scribing setups, dividers, bore checking gages, etc.

standards float on the detent pins, they can pivot and thus adjust to the parallelism of the gage block combination. This design of the pin assures free pivoting in all directions. It has a ball-center shaft, and so makes spot contact with the end standard. Pressure is transmitted squarely against the adjacent gage block and through the entire combination. If some blocks are not aligned, this squarely-applied pressure is assurance of rigidity and stability.

Because of the end accessibility afforded by the holder design, a number of unusual and standards designs have been possible, permitting numerous setups heretofore not considered possible. Among these is a foot, or T-shaped, block, incorporating a large platform. It can be used as a small base block to provide a firm base for constructing gages up to 25 inches. Or it can be used as a platform at the top of a combination for ease in setting dial indicators or other gages.

Ball end standards incorporate sapphire ball points and may be used for checking deep bore diameters. They





Vertical dimensioning is simplified through straight-line scribing setups of different heights assembled from components of the Micro-Step gaging system.

may be assembled readily by using one of these standards at each end of a combination. They also may be used as the points of a snap gage or as a point anvil for a dial comparator.

Knife edge caliper bars used at each end of a combination provide a means of checking concentricity of bores, or they may provide a knife anvil for a dial comparator, or as caliper bars for checking outside diameters. A base block provides a stable base for unusually long combinations. As many as three individual setups can be constructed on this block. Two setups may be quite a convenience, for example, in checking go and no-go tolerances.

A rather outstanding development is the pre-calibrated dial indicator set. This consists of a dial indicator, several calibrating blocks and several brackets for attaching the indicator to a calibrating block. The indicator-equipped block can be calibrated instantly and placed at the end of a holder as part of an indicating setup. Further calibration of the completed setup is not necessary. As an example of the simplicity of the assembly, the dial indicator might be fastened to the 3-in. block, the spindle tip of the indicator effectively on a level with one end of the block. By placing this end of the block on a surface plate, the spindle tip will also rest on the plate and can be quickly zeroed to the end of the block. A dial indicator setup is then constructed without further calibration by placing the indicator-equipped block in a block combination of the dimension to be checked.

Several auxiliary developments complete the Micro-Gaging system. There are extra long gage blocks to permit construction of long combinations. Extra thin and fractional gage blocks incorporate blocks for constructing dimensions below 0.002 in. They also may

be used as feeler gages for checking very small slots. In addition the set contains blocks graduated in steps of 0.000025 of an inch. Unusual blocks with vernier markings permit measurements in increments of 0.000010 in. Appreciably larger working surfaces

for the precision checking of angles on large work pieces is afforded by 5- and 10-in. sine plates, while the visible scale, an adjustable grid simplifying the reading of a pattern produced by interference bands, is part of the optical gaging items including optical flats.

### COMPRESSED AIR & GAS INSTITUTE WINS AWARD

One of the nation's highest honors recognizing the value of trade association services, the Award of Merit, has been conferred on the Compressed Air and Gas Institute. The award was presented to the Institute in the 1952 ATAE Awards for Distinguished Service sponsored by American Trade Association Executives of Washington, D. C.

The citation accompanying the award read in part, "for its excellent services

to its industry and especially for its education program centered on the schools of engineering throughout the United States and in the technical press."

The public relations program for the Institute has included some 50 case-history articles published annually in trade journals, publication of the "Compressed Air Handbook", a series of teaching films, lectures, reference pamphlets and surveys since 1947.

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# Tools of Today . . . .

## Single Face Flat Lapping Machine

This machine which is equipped with a 60-in. diameter segmental type bonded abrasive lap, provides a superior means for lapping large parts. It is efficient for lapping soft metal parts because it produces a clean, finished surface that is free from grit, either embedded or trapped in pores or crevices, and it produces this type of surface in a minimum of time.

This advantage of producing a uniquely clean surface on soft metal parts makes it possible to lap these to provide seal surfaces, wear surfaces, or surfaces to be subsequently drilled or milled without an immediate cleansing of the parts after lapping to remove all traces of embedded abrasive.

An additional advantage is provided by the bonded abrasive lap of this machine. This is the production of bright surfaces that require no subsequent polishing operation. This advantage is pronounced where soft metals must be produced with a bright finish.

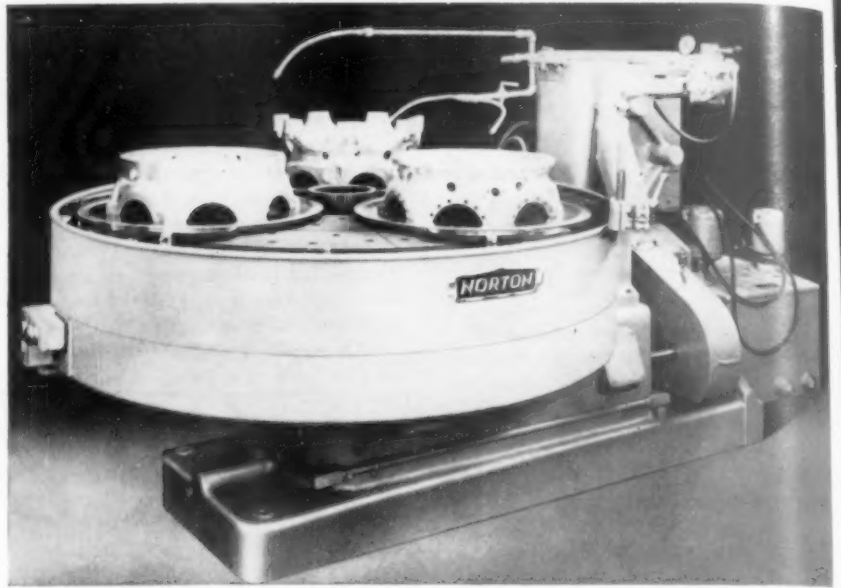
The machine provides accuracy because the accuracy of the product is controlled by the truing device. The original accuracy is maintained throughout the life of the lap by a simple diamond truing operation at infrequent intervals. The life of the bonded abrasive lap is considerable, and replacement is easy, as the lap is segmental and convenient to attach. Made by the Norton Co., Worcester 6, Mass **T-12-941**

## Gate-Riser Cut-Off

A radial-type gate and riser cut-off machine for all types of non-ferrous castings said to perform in one operation complete gate and riser removal is announced by the Acme Saw & Mfg. Co., Cleveland, Ohio. The cut-off is said to eliminate all of the hand labor operations of chipping, bandsawing and grinding formerly required.

The radial type cut-off is designed with bed, arm and carriage similar to conventional radial drills. The cutter carriage moves laterally on a six-ft swinging arm which is counter-balanced with a 15-hp motor on the opposite side of the 10-inch supporting column. The cutter arm, which rides on a 10-inch thrust bearing, may be rotated in a 360 deg arc and will cut up to a 55-inch radius, providing maximum versatility for all foundry service.

The cutter arm may be adjusted vertically to a height of 40 inches by means of an electrical power drive through



worm gears to adjusting screws fastened to an independent collar upon which the cutter arm rests.

All controls are located at the end of the cutter arm at the operator's station for maximum efficiency and operator convenience. The simple controls, at this point include only the starter; lateral adjustment wheel for the cutter carriage; the push-button control for vertical position of the arm, and a locking lever to lock the arm in position as desired.

Gate and riser cut-off may be done by swinging the antifriction bearing mounted cutter arm to pass through the work. The cut-off operation can be performed also by locking the arm and feeding the cutter carriage to make the desired cut. A revolving table pneumatically operated is available as an accessory for circular castings. In this instance, the cutter arm is swung into cutting position, the arm locked and the casting revolved on the table.

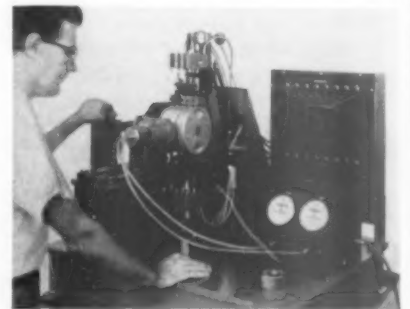
The Acme radial cut-off will cut from all sides of the casting on a horizontal plane. For further information write to Acme Saw & Mfg. Co., 1447 E. 47th St., Cleveland 3. **T-12-942**

## Piston Gage

A fast, positive-operating multi-dimension gage to measure all critical diameters of automotive and aircraft pistons in two simple operations has been announced by Federal Products Corp., 1144 Eddy St., Providence, R.I.

With the dual-measuring air plug in a vertical position the operator loads

the piston and checks both ends of the wrist pin hole for ID, taper and bell-mouth. The air plug is then rotated 180 deg to explore for out-of-round and other undesirable hole conditions. The slightest variation from a master setting is immediately noted by the Federal Dual Dimensionair.



As the gage handle is pushed forward, the piston takes a horizontal position between the contacts. Here all OD's are simultaneously inspected for out-of-tolerance by eight floating gage units and off dimensions are shown on the easy-to-read, white-on-black picture panel. Red lights show oversize; amber, undersize. These floating units are Federal Electricators which are extremely sensitive to the slightest OD variation. They are smaller and more compact, enabling multiple gaging at very close quarters.

The two simple levers, for loading the piston into position and lowering the contacts to the OD, work independently of operator influence.

**T-12-943**

## Hardened Copper Alloy

A copper-base alloy utilizing controlled amounts of tellurium, nickel and phosphorous that provides unusual properties including the combination of excellent machinability, hot and cold workability, good electrical conductivity, high-strength, age hardenability, high fatigue strength and good corrosion resistance is available from Chase Brass & Copper Co., Waterbury 20, Conn., a subsidiary of Kennecott Copper Corp. A patented Chase alloy, it is called Telnic bronze.

The physical and electrical properties of Telnic bronze and the suitability for hardening by heat treatment, hot working or forging without loss of good electrical conductivity are due to accurately proportioned amounts of nickel and phosphorous which must be used in combination. Good machinability, equal to 80 percent of free-cutting brass, is obtained by the addition of a controlled amount of tellurium. The use of tellurium does not present the disadvantage of hot shortness characteristic of leaded, high copper alloys.

Telnic bronze can be as readily hot pressed or hot forged as most high copper lead-free alloys and has properties that are superior to other high copper machinable alloys including leaded copper and leaded commercial bronze.

The alloy in as-forged or soft condition can be satisfactorily cold worked. In hard temper it can be swaged, headed or bent to a degree which is appreciable but limited by cold work of the final drawing operation.

Tool forms required for machining Telnic bronze are similar to those used for free-cutting brass but the use of carbide tips is recommended for prolonging tool life. Commonly used cutting speeds range from 200 to 400 feet per minute and the use of lubricants or cutting fluids is recommended to remove heat, minimize abrasion and erosion, to improve surface finish and for the removal of chips.

Telnic bronze is supplied as round rods  $\frac{1}{8}$  to  $1\frac{3}{4}$  inches in diameter, or as hexagonal rods measuring  $\frac{3}{16}$  to  $1\frac{1}{4}$  inches across flats. Rods supplied are of uniform quality and temper, sound, smooth, clean and commercially straight.

T-12-951

## Portable Drill

The Togglebug is a portable drill press that drills, reams, and countersinks. It is a one-man operation for metal shops, fabricating plants, structural steel organizations, railroad car building and repair shops, the shipbuilding industry, and various other miscellaneous applications.

Several improvements have been



made in the newly designed electrical model and to the new air model which, in turn, offers versatility to new and old users. The added power in the electrical model broadens the range of hole sizes to be drilled, prevents stalling, and offers an easy back-out method after the hole has been drilled. The air model has finger-tip control by using an easily accessible control on top of the handle.

The drill, by changing two bolts on the handle, reverses the spindle movement and permits it to operate in an upward position which has been widely used to drill holes in the bottom of ships. The control lever for the cutting compound is located near the power control and is adjustable for any desired flow and the tube distributes the

cutting compound right at drill point.

For further information, write the Guibert Steel Co., P. O. Box 1837, Pittsburgh, Pa.  
T-12-952

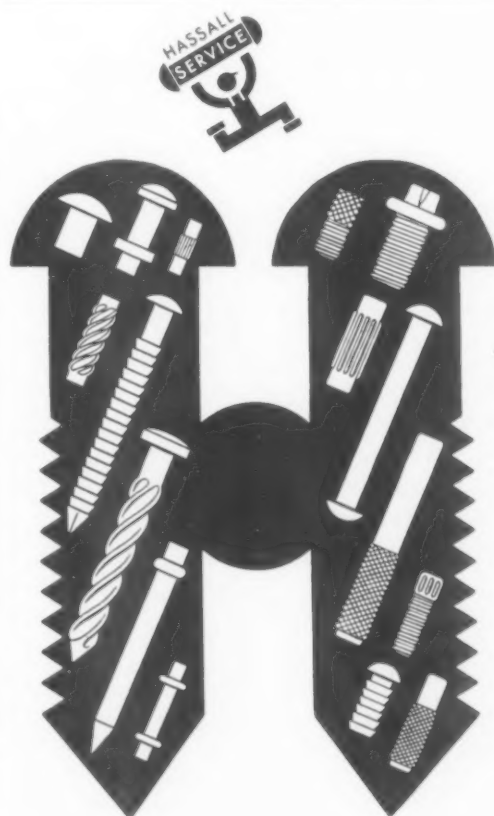
## Photo Copier

The legal-size Contoura photo copier will copy any color of written, printed or drawn matter up to size  $8\frac{1}{2}$  by 14 inches. It copies under normal artificial room lighting without fogging the paper, and saves time, work and expense in making permanent copies of legal-size documents, confidential papers and book pages.

The legal model Contoura combines portability with speed, convenience and economy. Photographic copying paper is placed on the subject matter to be copied. Contoura, with its patented translucent cushion, is placed over the copy paper and the switch turned on for an appropriate time exposure. At the operator's convenience, the photo paper can be developed in standard developing solutions.

Curvatures in pages due to tight book bindings do not affect the clarity of Contoura photo copies because its specially designed pneumatic cushion conforms the photo paper to page contours. For further information, write F. G. Ludwig Associates, Woodbridge, Conn.

T-12-953



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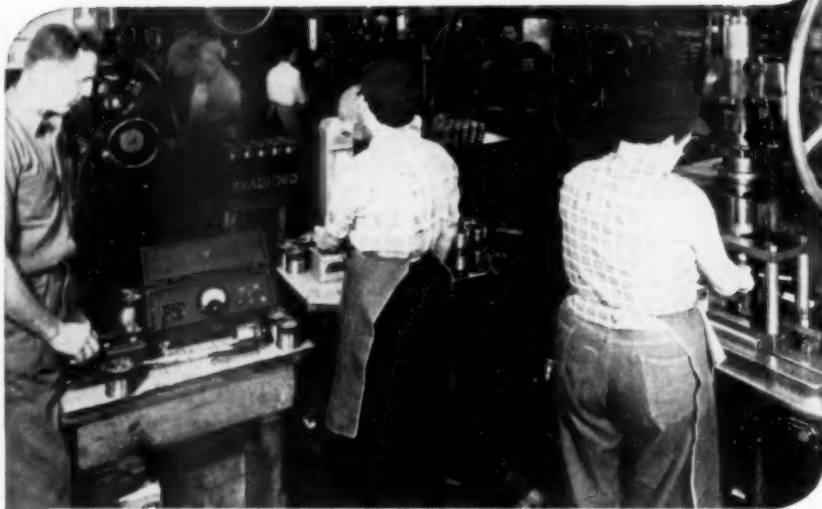
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-95

130 Clay Street  
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about the **PROFILOMETER**

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The above illustration shows the three final operations of the production line. The I.D. of the cylinder is bearingized, gaged for dimensional tolerances, and then surface roughness is checked with the Profilometer. Only seconds away from the machining operations, the Profilometer provides the information necessary to assure constant control of the specified surface finish—which, in this case, is from four to six microinches.

In plants throughout the world—wherever control of surface roughness is a requirement—you will find the Profilometer in use as a fast, simple and accurate shop tool. On the job at the time when surfaces are being produced, it can and does make possible many worthwhile savings in production costs.

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Instrument Manufacturers

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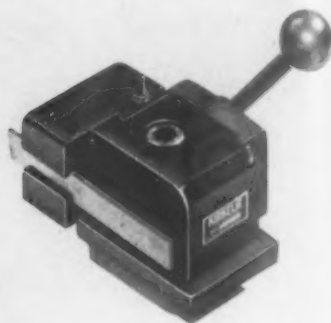
**MICHIGAN**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-96

### Tool Holder

A tool holder, with component boring adapters, to fit all standard engines and turret lathes and which provides many new features for increasing production speed has been introduced by The Kirkelie Co., 8717 Darby St., Northridge, Calif.

After over a year of field testing the unit, the following features, according to the maker, have been proved: vertical adjustment of tool bits can be made without the moving of bits in their



holders; there are no shims needed for height adjustment of tool bits; positive repeating is made possible with unlimited number of tool bits or operations; the tool bits can be removed with holder adapter for resharpener without changing set-up; tool bits will produce 100 percent longer because of the tool holder's rigidity; because tool bars are removed vertically the necessity of moving the carriage back is eliminated, thus reducing the carriage and bed wear of lathes as well as saving the operator from 15 to 20 percent in production time; close tolerances can be held easily because the unit repeats within 0.0003 inches. **T-12-961**

### Flexible Coil Forms

Coil forms with special flexible flanges completely eliminate taping operations on motor field coils. Known as Flexiform bobbins they cut both production time and labor requirements in coil installation. This is an important factor in speeding up assembly lines, especially where mass production techniques are desirable. In addition, the reduction and simplification of operations, as compared to those where taping is required, are said to result in substantial cost savings.

Since automatic equipment is used in the making of Flexiform bobbins, they can be readily supplied in shapes and sizes as specified at an economical price. Flanges are of flexible rope paper and are fastened to the core by an exclusive process which eliminates swaging. Dielectric kraft paper is used for the core. For further information write to the Precision Paper Tube Co., 2035 W. Charleston St., Chicago 47. **T-12-962**



## Rubber Wheels

An improved line of rubber wheels for grinding ball-bearing raceways has been announced by the Bonded Products and Grain Div., The Carborundum Co., Niagara Falls, N. Y.

In production-run studies made with the wheels, bearing manufacturers' requirements have been exceeded as to quality of finish and production rate. The wheels provide free-cutting action, thereby minimizing generation of heat and insuring a high degree of accuracy. Chatter is virtually eliminated.

In addition to the cool cutting qualities achieved through the use of the R3 bonded wheels, excellent form-holding characteristics and shape maintenance throughout the entire life of the wheels are also realized.

Because of the versatility of the R3 bond, the standard specifications covering the line of wheels are simple and compact. Only two grain types are employed, one that meets more grinding requirements, and the other intended for use in special production conditions.

T-12-971

## Roller Printer

The hand roller printer is an industrial tool for coding, striping, identifying and many other marking applications. It is used for printing on large



pipe, steel or concrete, edges of glass sheets, lumber, striping steel bars, sheet metal, drums, crates, corrugated bales. Printing wheels may be changed quickly. Special inks are made to order or stock inks may be used. Jet Mfg. Co., Inc., Boston 30, Mass.

T-12-972

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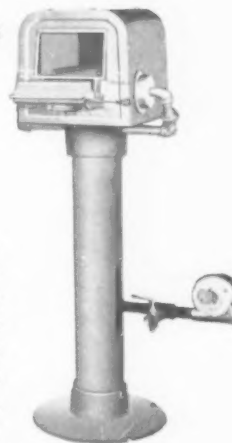
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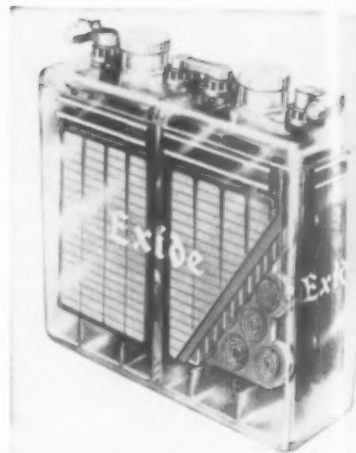
## Storage Batteries

The new series of Exide-Manhex batteries in transparent plastic containers announced by The Electric Storage Battery Co. are known as Type CME. They are available in both two-cell and three-cell units built to meet the most rigorous service demands in stationary small power applications.

Benefits attributed to the batteries are dependability for vital applications, low operating and maintenance costs, greater watt output per unit of space, highly sustained, useful voltage even during heavy discharge, greater damage resistance through the use of plastic

containers and covers, improved flexibility of arrangement without the use of wood trays, fewer cleaning problems, and availability as "dry" batteries when required.

The transparent containers and covers are molded from clear, heat-resistant polystyrene, a stable plastic material possessing resistance to damage from shock, thermal and mechanical stresses, and any effects from the electrolyte. The permanent seal between containers and covers eliminates leakage of the electrolyte for the life of the battery. And reduced weight makes for lower transportation charges.

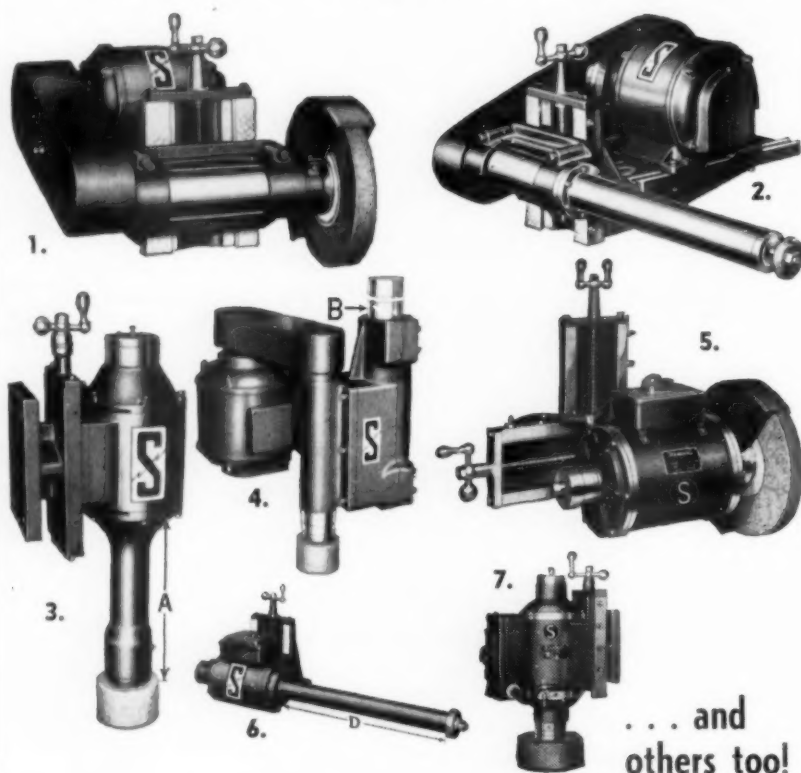


Double insulation between positive and negative plates is provided by the use of microporous rubber separators and slotted plastic sheets, which permit free diffusion of the electrolyte, at the same time being impervious to chemical action or temperature changes within the cell.

Maintenance is rendered easier by colored pilot balls, which reveal at a glance the state of charge in the batteries, and by colored lines on the containers marking the recommended upper and lower levels of the electrolyte. Ample watering space is provided, and the exclusive funnel-type filling vents molded into the covers simplify the infrequent addition of water. Unbreakable, spray-proof vent plugs of polyethylene are designed to keep out dust and other foreign matter.

For further information, write The Electric Storage Battery Co., Box 8109, Philadelphia 1. **T-12-981**

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1. Belt driven Lathe Grinder  $\frac{1}{4}$  H.P., to 20 H.P.
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## Pilot Air Valves

A line of pilot air valves has been announced by Rivett Lathe & Grinder, Inc., Boston, Mass. Known as the Series 3000, they are used for remote control of pilot pressure-operated four-way air valves, and can also be used for remote control of Rivett air pilot hydraulic valves. These pilot valves can also be substituted for direct control valves in such installations where a  $\frac{1}{4}$ -in. three-way air valve is indicated.

Simplicity marks the new design. Operating the valve allows air to flow to the out port. A spring returns the valve to its original position, blocking the air supply, and bleeding the out port.

Six types of operation are available. The palm button, push button, and cam are offered in both side and foot mountings. The foot and solenoid types are offered only in foot mountings.

Write to Rivett Lathe & Grinder, Inc., Brighton 35, Boston for further information. **T-12-982**

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## Cutting Carbide



### Why you should investigate S-6 at once

- S-6 Carbide is a brand new and different grade of Cutting Carbide.
- S-6 Carbide performs best at slow speeds where other carbides cannot be successfully used. — It is especially suitable for use on old or slow speed machines.
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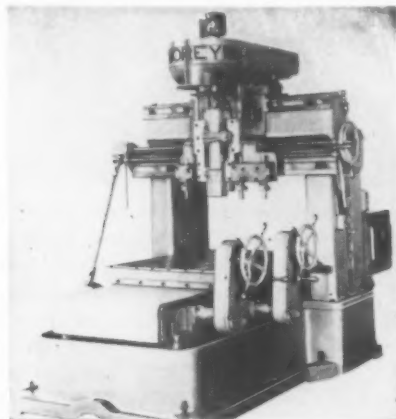
PITTSBURGH 21, PA.

Plant at LATROBE, PA.

INDICATE A-12-99-1

## Milling Machine

A machine specifically designed for milling and profiling large forgings and castings such as aluminum and magnesium air frames, as well as cast iron parts and steel forgings, has been developed by Morey Machinery Co., Inc., 410 Broome Street, New York 13. The Morey No. 40M heavy duty vertical



aeroform profiler and milling machine combines rigidity of construction with maximum power to take full advantage of tungsten carbide tools. It is equally useful for heavy cuts in irregularly shaped steel forgings and castings, cast iron frames of computing, type setting and similar complicated precision machine parts.

The machine has a two-speed 15-hp motor and operates through a backgeared drive to provide a wide spindle speed range of 125 to 4600 rpm. Construction is such that vibrations are minimized at the cutting tools.

Several significant design improvements are incorporated in this single-spindle, bridge-style profiler and milling machine. The cross head is mounted in balance on a vibration-damped cross rail. Bridge columns are designed for the addition of raising blocks to increase bridge clearance. Anti-friction bearings are used throughout the machine. A simple adjustment to take up all backlash in control gears enables the operator to control milling to very close tolerances.

Centralized one-shot lubrication simplifies maintenance. The Morey 40M will not run unless the lubricator is operating, thus minimizing the need for repairs. A large coolant tank is built into the machine base.

The profiler has both taper and straight follower holders. A lamp is built into the bridge. Both control arms are adjustable to suit the convenience of the individual operator, thus reducing work fatigue to a great extent.

The Morey 40M can be supplied in any table length up to 10 feet. Copying attachments are available for any and all movements.

T-12-991

**New XL BOND**  
FOR CARBIDE TOOL AND CUTTER

## Grinding



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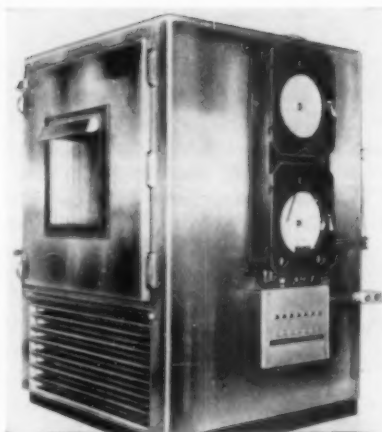
Dept. TE, 1101 W. Monroe St., Chicago 7  
INDICATE A-12-99-2



## Test Chambers

To supply industry with a standard line of environmental test chambers for conducting temperature-humidity tests, Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J. has standardized on five basic-chamber types. This standardization permits purchasers to select chambers from existing specifications and eliminates the extra cost of custom built models. These chambers automatically maintain humidity from 20 to 95 percent through a temperature range of 35 to 185 deg. F. Minimum dew point is 33 deg F.

The chambers, known as the Tenney TH Series, come with the following inside dimensions: (1) 22 x 19 x 48 inches, (2) 42 x 18 x 48 inches, (3) 36 x 31 x 36 inches, (4) 42 x 24 x 48 inches, and 48 x 24 x 48 inches. Models 1 and 3 have one door; the others have two. Common to all models are accurately calibrated indicating thermostatic



controllers, air circulating blowers for uniform movement of air, and stainless steel interior and exterior paneling.

Four types of control are incorporated in the chambers; constant humidity, constant temperature; constant humidity, varying temperature; varying hu-

midity, constant temperature and varying humidity and varying temperature.

Applications of these chambers include: (1) simulation of constant or varying climatic conditions for testing electronic components, communications equipment, instruments, and similar units, (2) checking compliance with government specifications of manufactured parts for government use, (3) package testing, to ensure resistance to or retention of moisture in hygroscopic foods or other products, (4) moisture testing for the protection of delicate mechanical parts, ensuring moisture-tight seals and packaging, (5) testing for corrosion in various atmospheres, (6) durability testing to determine resistance of paints, plastics and other materials to corrosive climatic conditions.

T-12-1001

## Tool Holder

This holder named the Huski-Cut is capable of extremely heavy feeds and very high speeds and offers many advantages over standard tipped tools and other mechanically held insert holders according to the maker. No brazing is



required and the shank need never be ground. The Huski-Cut will stand more heat than a brazed tool, especially where no coolant is applied.

Much finer adjustment is possible because there are no serrations with which to contend (serrated clamping confines adjustment to intervals of  $\frac{1}{16}$ -inch; Huski-Cut reduces this fractional adjustment to infinitesimal dimensions). The insert can be adjusted without removing the holder from the machine. Users are always assured a constant length at the cutting edge throughout the life of the tool.

Simplified construction involving only 5 parts, is responsible for the outstanding features of Huski-Cut. The features include a quick positive lock with a half turn of one screw, and the fact that all control screws for locking and adjustment are never subjected to chip wear.

Insert holes are broached for perfect alignment and positive rigid holding. The overall dimensions of the shank conform to standard tool specifications. The Huski-Cut is offset to provide generous chip clearance and it is available in three standard styles and forty standard sizes.

For information write to Wesson Co., Ferndale 20, Mich.

T-12-1002



## NEW many purpose individual Vulcanaire

### DUST COLLECTING UNITS

Use on surface and other grinders where any kind of grinding dust must be removed. Salvage diamond dust.

Inexpensive, compact units, with no moving parts.

Operated from your present air supply

Installed in a few minutes, eliminating need for costly centrally located dust collecting systems.

The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

Vacuum pick-up device (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. This mounting permits constant contact with dust as the wheel is moved up or down.

A simple needle valve operates the unit, and can be shut off when machine is not in use.

Available in two sizes: 700 series for grinding wheels 7" dia. or less—200 series for wheels 2" dia. or less.

### "SALVAGE INDUSTRIAL DIAMONDS FOR DEFENSE"\*

\*That is the title of the National Production Authority's booklet which describes the growing critical shortage of industrial diamond supplies.

The shortage will soon result in idle machine tools, and lost defense production unless we straightway begin to conserve grinding wheels and salvage diamond dust. The N.P.A. fully and helpfully explains the methods for doing these things.

Request this N.P.A. booklet on your letterhead and Vulcan will be glad to send it to you. You will also receive literature on the versatile Vulcanaire Dust Collector which promotes health in your plant and turns dust into money.

It's made by the makers of Vulcanaire  
The jig grinding attachment

VULCAN TOOL CO., • 7300 Lorain Avenue, Dayton, O.

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# THE TOOL ENGINEER'S

# Service Bureau

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

## LITERATURE NUMBER

## COMPANY

## BULLETIN

## DESCRIPTION

A-12-161	Haynes Stellite Co., Div., Union Carbide & Carbon Corp. ....		New manual "Haynes Stellite Metal-Cutting Tools" gives valuable information on how to use tools on your machining jobs.
A-12-187	Illinois Tool Works .....		"Know Your Master Gears" tells how to be sure of gear accuracy and gear performance.
A-12-109	The B. Jahn Mfg. Co. ....		All chance, all error, all uncertainty eliminated with "Production Proved Dies."
A-12-195	Jones & Lamson Machine Co. ....		Cut better threads at lower cost! Catalog cites advantages of J. & L. Dies and Chasers.
A-12-29	Lapointe Machine Tool Co. ....	SRHES	Fifty years in broaching means broaching speeds in excess of 150 fpm.
A-12-129	Lodding, Inc. ....		Catalog shows 365 items that save time and money.
A-12-186	Logan Engineering Co. ....		Logan Lathe and Shaper Catalog shows Logan Lathes to be the key to profitable operation.
A-12-114	Lovejoy Tool Co., Inc. ....		Free catalog describes superior performance plus maximum economy with Type "A" blades.
A-12-170-4	Metal Carbides Corp .....	50-G	"Tallide" meets every requirement—triples production—cuts costs in half.
A-12-183	Miller Motor Co. ....	B-200	Full details given in bulletin on fluid pressure boosters.
A-12-121	Morton Machine Works .....		Fixture clamps and components—dependable, durable, economical.
A-12-174	National Broach & Machine Co. ....		Red Ring Gear and Spline Grinders described in folder. Highest accuracy in both lead and tooth form.
A-12-99-1	Newcomer Products, Inc. ....	108	Brand-new and different grade of Cutting Carbide described in catalog.
A-12-9	Niagara Machine Tool Works .....	69	Niagara shears designed for high volume shearing, accuracy, dependability, low maintenance costs.
A-12-170-1	Oakite Products, Inc. ....		Best and cheapest methods explained in booklet "How to Strip Paint."
A-12-104-1	O'Neil Irwin Mfg. Co. ....		Booklet "Di-Acro" shows how "Die-less Duplicating" saves tooling costs, speeds production.
A-12-108-1	Ortman Miller Machine Co. ....		MORE POWER in less space with O-M air, water, hydraulic cylinders.
A-12-158-5	J. A. Richards Co. ....	TE-5	Multiform Big Brother Bender produces without special tooling—saves die costs and expensive presses.
A-12-165	Sentry-Jones and Co. ....	S-50	Bulletin shows complete information on S-J Counterbores, Countersinks and Core Drills.
A-12-128	The Sentry Co. ....	WE-2	"More Life—More Production—Easier Operation" with Wet-more Reamer.
A-12-166	Standard Tool Co. ....		New Hob Tolerance Chart gives solution for tough jobs.
A-12-206	Stocker & Yale, Inc. ....		Free optical project catalogs including data sheet.
A-12-201	D. A. Stuart Oil Co. ....		"More than a 'coolant' is needed" with a difficult broaching job on a soft, tough steel.
A-12-207-2	F. A. Sturtevant Co. ....		Valuable data on Sturtevant torque wrenches—permanently accurate, practically indestructible.
A-12-137	Tuthill Pump Co. ....		Tuthill Pump Guide simplifies choosing the right pump for the job.
A-12-152	The Van Keuren Co. ....	35	Something new! V.K. Calibrated Steel Balls.
A-12-100	Vulcan Tool Co. ....		N P A booklet describes new many-purpose individual Vulcanaire dust collecting units.
A-12-156	Wales-Strippit Corp. ....		Years of research, engineering and production "know-how" have made Wales hole punching and notching equipment the most complete line.
A-12-111	Ward Leonard Electric Co. ....		A chromaster for every shop! Cost-cutting, free information offered.
A-12-138	S. B. Whistler & Sons, Inc. ....		Complicated piercing operations simplified with Whistler adjustable and magnetic perforating dies.

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TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

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A-12-207-3	Ace Drill Bushing Co. ....	1101-2	Materials, engineering design, availability and faster service with "ACE" Drill bushings.
A-12-148-1	Acme Industrial Co. ....		New Acme Bushing Catalog contains America's largest bushing selection.
A-12-205	Adamas Carbide Corp. ....		"ADAMAS" Aids to Carbide Users helps to secure steady, daily production advantages.
A-12-149	Allegheny Ludlum Steel Corp. ....		Free booklet offers 8 pages of useful information on how to save needless operations in manufacturing.
A-12-164	American Broach & Machine Co. ....	300	Circular helps to solve broaching problems the American way.
A-12-190-1	Ames Precision Machine Works ....		Folder explains "Rockwell Hardness Testing Made Easy."
A-12-139	F. E. Anderson Oil Co., Inc. ....		Longer life for cutting tools; machine output doubled and tripled explained in free book.
A-12-123	Armour & Co. ....		Free booklet tells how to triple production in backstand-belt polishing.
A-12-146	The Bellows Co. ....		Bellows "Controlled Air Power" bulletin offers faster, safer, better production.
A-12-126	Bealy-Welles Corp. ....		Greater grinding efficiency assured with Bealy-Titan "Job-Fitted" wheel service.
A-12-15	Carborundum Co. ....		"Tell-all" booklet explains center type cylindrical grinding.
A-12-194-2	Chicago Rivet & Machine Co. ....		Lower the boom on costs—set rivets fast with Chicago 214. Free catalog.
A-12-158-2	Chicago Tool and Engineering Co. ....	10	Circular explains how Dual Cross calibrates Rotary feeds.
A-12-20	Cincinnati Lathe & Tool Co. ....	S-102	Minimum investment; round-the-clock dependability with Cincinnati Model LT lathes.
A-12-17	Cincinnati Lathe & Tool Co. ....	T-108	Tray-Tops offer complete line of modern design, light-duty engine lathes.
A-12-145	Cincinnati Milling Machine Co. ....	M-1759	Bulletin explains advantages of Hydro-forming as applied to production.
A-12-22	Cincinnati Shaper Co. ....	S-6	Accuracy, dependability, economy, realized in using Cincinnati shears.
A-12-179	Crucible Steel Company of America ....		A twist of the dial gives the tool steel for your application with Crucible Tool Steel Selector.
A-12-21	Delta Power Tool, Div., Rockwell Mfg. Co. ....		Delta Drill Unit Catalog describes quick solution of knotty machining problems.
A-12-97-1	Diamond Products, Inc. ....		Greater diamond utility and lowest production cost with "Prestalloy" diamonds.
A-12-189	The DoAll Co. ....		Complete data and description of DoAll grinder design and construction given in new catalog.
A-12-140	The DoAll Co. ....		DoAll Band Tool Manual contains 160 pages of helpful information on use and selection of saw bands and other band tools.
A-12-147	Eastman Kodak Co. ....		"Kodak Contour Projectors" booklet simplifies problems through precision micrometry and fast routine gaging.
A-12-215	Ex-Cell-O Corp. ....	35371	Bushing Catalog gives reasons why Ex-Cell-O Jig Bushings last longer; perform better.
A-12-194-1	The J. C. Glensier Co., Inc. ....	J	Glenco floating tool holders increase production by reducing rejects.
A-12-122-2	Graymills Corp. ....		Portable Coolant systems and pumping units described in new catalog showing selection chart.
A-12-200-2	Grabet File Co. of America, Inc. ....	HC1	Six staggered cutting edges eliminate all chatter.
A-12-93	Hammond Machinery Builders ....	225	Hammond Carbide grinders grind high-speed tools easily, accurately . . . better.
A-12-139	Hannifin Corp. ....	150	"Hy-Power" Hydraulic equipment rivets cold with "silent squeeze" method.
A-12-4	Hannifin Corp. ....	110	Hannifin series "N" cylinders—designed and built for superior performance—longer life.

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3914-18 W. Shakespeare Ave.

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INDICATE A-12-103-1

December, 1952

### Indicator Points

Durable carbide indicator points in convenient, time saving sets have been introduced by The Eastern Tool Co. Made of diamond-hard carbide, these ETCO indicator points have been proven to outlast tool steel indicator points by as much as 400 times. The



wear-resistant carbide tips take sudden gaging shocks and friction of rapidly revolving cylindrical pieces with ease, assure more precise gaging for longer periods. Each ETCO set comes complete with five standard shaped points, flatface, ball point, needle point, conical point, and convex face. Each is ready for instant use on any gaging job. They are all packaged in a mahogany case. Also available are sets of six of any one shape in a permanent mahogany case. Further information may be obtained by writing The Eastern Tool Company, East Hartford, Conn.

**T-12-1031**

### Press Touch Control

A versatile type of control, now available on their Multipress, has just been announced by The Denison Engineering Co., Dublin Road, Columbus 16, Ohio. To be known as touch control it is a servo-type valving in the oil hydraulic press circuit that through its linkage with the hand control gives instant-response ram action. Extremely close control over ram speed is accomplished through a hand control lever. Whether the lever is pressed rapidly or slowly, the ram follows up to its maximum speed. To any kind of up and down hand motion the ram responds instantly. Minimum ram stroke is about 1/16 inch; maximum six to fifteen inches, depending on the model of Multipress.

Other reported advantages of this touch control are that it allows fast ram approach to work and then when the ram contacts the work, it can be inched carefully (avoiding sudden impact) to provide maximum safety for tooling and fixtures. It offers desirable controllability for varying conditions of die fill, material thickness, etc. **T-12-1032**

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*The Reamer Specialists*

**LAVALLEE & IDE, INC.**

CHICOPEE, MASS.

INDICATE A-12-103-2

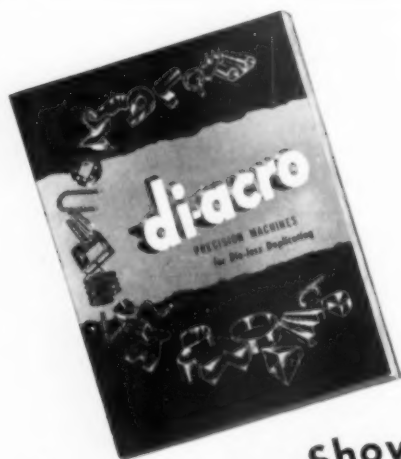
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Producers of fine tool steels—High Speed Steels  
Die Steels—Hot Work and Shock Resisting Steels  
Carbon Tool Steels.



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**New Catalog Shows How**

Di-Acro (pronounced Die-ack-ro) is the registered brand name for Di-ACRO Brokes, Notchers, Punch Presses, Rod Parters, Rollers, Shears, Benders.



**"DIE-LESS DUPLICATING"  
SAVES TOOLING COSTS,  
SPEEDS PRODUCTION**

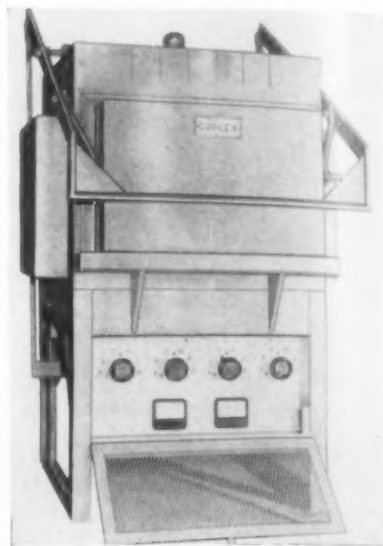
Shows many photos of "Die-Less Duplicating" forming technique with Di-Acro Machines. Features 36 hand and power models in quick reference tables. Explains free Di-Acro Engineering Service. Write for your copy now.

**O'NEIL-IRWIN MANUFACTURING CO.**  
375 8th Avenue • Lake City, Minnesota

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-104

## Heat Treating Furnaces

Three models in a line of electric high-speed tool steel hardening furnaces are announced by the Cooler Electric Mfg. Corp., 38 South Shelby St., Indianapolis 7, Ind. Operating temperatures cover the range of 1650 to 2500 deg F. The following chamber sizes in inches are available: 6 1/4 wide x 4 high x 9 long; 12 wide x 8 high x 18 long; 12 wide x 8 high x 24 long.



The control of power is accomplished by use of multiple-tap transformers arranged for selected voltages to be applied to the Globar heat elements located at the top and the bottom of the chamber. A feature of this design is the location and arrangement of the tap changing switches and ammeters which are placed at the front of the furnace for the convenience of the operator. Control of temperatures is handled by a standard pyrometer arrangement.

The furnace is heavily insulated by high temperature refractories. The furnaces have an efficient front door. Its size and thickness make it virtually a moving front wall which gives unusual thermal efficiency and results in economy from reduced door losses.

**T-12-1041**

## Magnetic Lifter

A magnetic hand tool for feeding steel into punch presses is announced by the Magnetool Div. of Multifinish Mfg. Co., Dept. 528, 2114 Monroe, Detroit 7.

It can be quickly adjusted for pieces of almost any size or shape and the self-aligning magnetic blocks overcome irregularities, dirt and chips. The tool releases instantly at a slight twist of the wrist, and is used to remove or insert parts in a press or to separate stacked sheets. It will feed sheets, formed parts, even castings.

**T-12-1042**



## Wet Blasting Machine

The addition of a new model to its line of wet blasting machines is announced by American Wheelabrator & Equipment Corp., 1182 S. Byrkit St., Nishawaka, Ind.

Known as the model 64 Liquamatte, it is intended for all precision cleaning and finishing applications involving large and heavy pieces. Some typical applications are in the manufacture and maintenance of forging dies, die-casting dies, and drawing dies; in the manufacture and maintenance of glass, plastic, and rubber molds; the reconditioning of plant engines, oil burners, etc.; cleaning jet engines after shakedown tests; surfacing tools, such as long broaches, before and after plating; blending different types of finishes on aluminum; removing heat treat scale, and deburring.



This machine, sized 6 ft in length by 6 ft 10½ inches in depth and 8 ft 11 inches in height, will handle single pieces or loads of pieces up to 3500 lb in weight. It has two 49 x 36-inch counter-balanced doors and has a 6-ft long accessory tank to receive the parts from the blast chamber for rinsing.

Fine mesh abrasives, suspended in water, are propelled at the work by compressed air, but since such fine mesh abrasives are used (80 to 2500 mesh), close-tolerance dimensions are maintained, and sharp corners, lines and lettering in patterns, flat surfaces, knurling, thin-walled sections, and other normally vulnerable areas remain undamaged and unaltered.

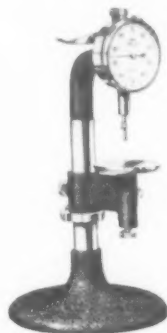
Another feature is the vertical pump for slurry agitation and recirculation. It is adaptable to rugged service, and because of its position, it eliminates all suction piping, valves, fittings, and labor for removing them for inspection of the pump. It is always primed by flooded-type suction. Loss of slurry through leakage is eliminated, because there are no packing glands. Abrasive can't plug the pump impeller when the machine is shut down. Another important feature is that the hopper need not be drained before the pump is removed.

T-12-1051

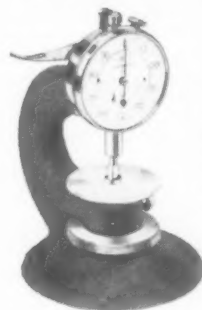
## FOR *Strictly* IMPERSONAL INSPECTION CHOOSE AMES DIAL COMPARATORS

Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy — the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

Check the Ames Dial Comparators shown — one of them may solve a Quality Control problem for you.



**Ames No. 1** Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated *Ames No. 1W* when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials, such as rubber, plastics, etc.



**Ames No. 2** Dial Comparator is a compact, stable bench model for measuring non-yielding materials — sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. *Ames No. 2W* is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.



**Ames No. 13** Dial Comparator features flat-ground, cast-iron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames Micrometer Dial Indicator.



**Ames No. 130** Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

*Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.*

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# Turn problems into profits

## with GORHAM-Engineered Special Cutting Tools

For fast, practical solutions to tough tooling problems, call in the expert . . . your nearby Gorham Field Engineer! He provides a complete engineering service to determine your exact tooling requirements. For instance:

• He starts with your product, sketch or idea.

• He surveys your production operations and your available equipment.

• He considers work material properties and desired finishes and tolerances.

• He plots proper machine feed, speed and method of tool driving.

• then . . . he develops practical design and engineering specifications for a special cutting tool, metallurgically "tailor-made" for your application.

... and his recommendations are backed by Gorham's unmatched facilities! These include three fully-equipped manufacturing plants, large Engineering and Metallurgical staffs, and the finest heat treating equipment.

These resources, plus Gorham's more than thirty years' reputation for producing the finest cutting tools, are dedicated to furnishing prompt and profitable solutions to your special tooling problems. Gorham-engineered "specials" are turning problems into profits in thousands of plants every day . . . why not let them do the same for you?

If you haven't met your nearby Gorham field Engineer, write for his name, or send details of your problem direct for recommendations.

## Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14407 WOODROW WILSON • DETROIT 3, MICHIGAN

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## Fixture Clamp

A quick-acting fixture clamp incorporating the Saxton principle of clamping, has been introduced by Cincinnati Industrial Supply Co., 11930 Ingwood Ave., Hawthorne, Calif.



The unit is suited for milling, drilling, riveting and assembly fixtures. A twist of the wrist removes the trunnion from the retaining hook in the mounting bracket, and the full open position gives unobstructed vertical clearance for removal of finished work. The powerful gripping capacity of the clamp, combined with its non-flexing design, eliminates chatter during milling or intermittent cutting operations.

The screw operation and vibration absorbing, spring bearing trunnion insure a firm, steady grip in riveting or other abusive fixture applications. The unit can be closed and adjusted in one operation. It is durably constructed of roll forged steel instead of pressed metal and has a black oxide finish. Cadmium plate or electro-zinc finishes are available when specified. Sizes presently available include 3- and 6-inch throat depths.

T-12-1061

## Power Punch Press

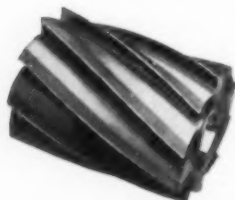
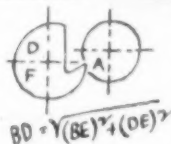
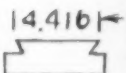
Whitney Metal Tool Co., Rockford, Ill. announces the introduction of model 150 deep throat power punch press. The No. 150 has a 24-inch throat depth as compared to a 12-inch depth in the No. 129 and 18-inches in the No. 130. Length of stroke is 2 inches, exceeding both other models by  $\frac{3}{4}$  inch. The machine is also equipped with a non-repeat clutch which, if desired, can be released for automatic feed.

Capacity of the machine is 10 tons and it is rated at a speed of 175 strokes per minute. The press is designed so that the flywheel is in the rear. This feature permits easier feeding of stock and gives the operator a greater margin of safety. The press has a 5-ton safety factor and it is mounted on a sturdy, all welded steel frame.

T-12-1062

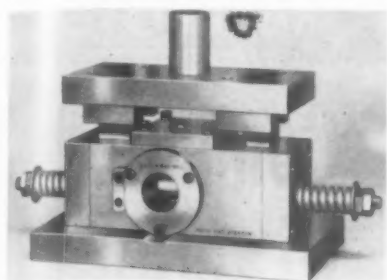


check this with Gorham



## Pipe Notcher

The Vogel Arc-Fit pipe and tube notcher, for use with a punch press, notches both sides of the pipe end with a single stroke of the press. When tubing is fed into the die, the die punch goes inside the tube end. As the press ram comes down, the punch is driven

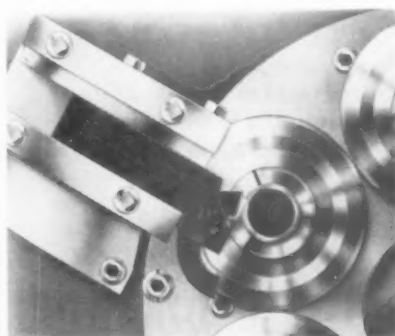


laterally to notch one side of the tube end, then immediately in the opposite direction to notch the other side. Cutting is from the inside out, leaving clean edges that require no further finishing. Perfect alignment of the notches is automatic. The time required is stated to be only two to three seconds for the double notching. This tool is called the Twin-Notch Arc-Fit to distinguish it from the standard Arc-Fit which cuts one notch at a time in pipe and tubing ends. Interchangeable dies, punches and spacers make it adaptable for notching 1/2 to 2-inch pipe and tubing. For further information write Vogel Tool and Die Corp., 1807 North 32nd Ave., Melrose Park, Ill.

**T-12-1071**

## Circular Cut-off Tool

A circular cut-off tool based on a different concept of tool design is now offered to the metalworking trade by the Cir-Cut Div. of The New Britain Machine Co., New Britain, Conn. The tool fundamentally is a semi circular disc of finest grade high-speed steel,



with the cutting surface in the periphery, similar to what would result were it possible to take a conventional straight cut-off tool and bend it into a half-round with its cutting edge on the outer diameter.

The blade is mounted in a holder with all but the necessary cutting edge protected by an envelope or shroud. The tool is so ground that when the

lead, or cutting edge of the tool, is in the same plane as the front of the holder, it is properly positioned. The tool holder is accurately located in the machine so that the cutting edge of the tool is in the spindle center line. The present holder can be substituted for the conventional straight blade holder in most screw machines up to 1-5/8-in. capacity.

In design, the profile of the Cir-Cut tool differs little from conventional blades. The top, or periphery, of the tool is hollow ground to collapse the chip and lessen heat generation from chip flow on the edges of the tool. Side clearances are ground in the blade during manufacture and remain constant throughout the life of the blade. The front clearance angle is ground in the blade prior to shipment and to facilitate grinding guide lines

are stamped on the sides of the blades. Top rake is constant, being built into the tool as it is resharpened. Control of chip during the cut is maintained by grinding the shroud, not the tool edge.

Since the tool will, in all probability, be installed on machines already in service, tool holder adapters have been designed to complement the tool holder assembly. These replace the present tool holder adapters and not only assure proper alignment with the spindle but permit a total of 0.090-in. height adjustment to correct for spindle variations. With the tool holder properly positioned on the adapter plate, there is little possibility of obtaining anything but flat cuts. Since the tool can be removed from holder and replaced accurately, it automatically holds center and size.

**T-12-1072**

# 5 tips serve every machine in your plant!

There is no need to stock all the various sizes of Morse, Browne & Sharpe, or Jarno taper centers when the INTOCO line of adapter shanks and 5 sizes of insert tips will do the job.

The INTOCO line of lathe and grinder centers is the result of extensive research and engineering. Centers are of two piece design, consisting of a shank and replaceable tip. INTOCO Center Tips are made in four different alloys to fit the many different applications that the modern shop is called upon to machine.

INTOCO Tips are ground to a fine tolerance and finish, and perfect concentricity is maintained between the O.D. of the shank and the center point.

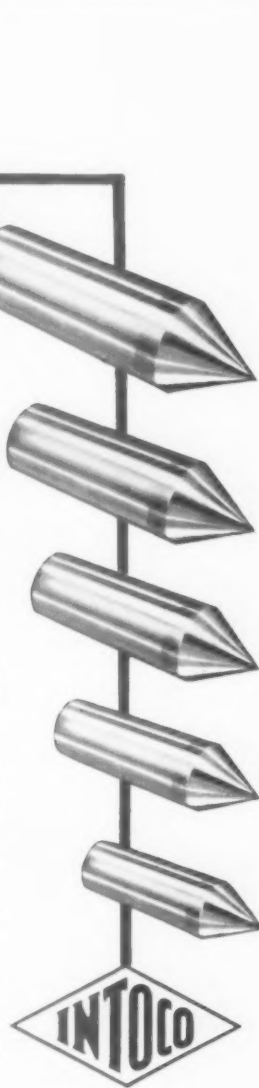
Learn more about the INTOCO line and how it can increase shop production and save you time and money. Don't delay — write today for free 8 page catalog which gives complete specifications on INTOCO Standard and Gash Type Center Tips.

## INTOCO SALES CO.

distributors for  
INTERSTATE TOOL COMPANY  
Engineers, Designers and Builders of Special Machinery, Plant Equipment and Tools

431 W. 58TH ST. CHICAGO 21, ILLINOIS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-107





**MORE POWER**  
*in less space!*

**O-M**

## CYLINDERS

air • water • hydraulic

Available in a full range of sizes (1½" to 8" bores), powerful, dependable O-M Cylinders require ½ less installation space than conventional type cylinders of equal bore. The rods and bulky end caps have been eliminated by a special *Internal Locking* process found only on O-M Cylinders. Saves space . . . provides better balance . . . permits use of more bore power for the job. O-M Cylinders are easy to install, easy to repack. All machined steel with bearing bronze (no castings). Complete range of mounting brackets, interchangeable bore for bore.

### 14 DAY DELIVERY

Complete standardization of interchangeable parts and mountings (which eliminate the need for castings and special patterns) speeds production, cuts costs . . . reduces delivery time to two weeks on nearly all O-M Cylinders.



Send for  
**FREE CATALOG and  
Complete Templates**



Details and specifications on O-M Cylinders and parts. (Standard, oversize and 2-1 piston rods). ½ scale templates show cylinders and mounting brackets.

**MAIL COUPON NOW**

**ORTMAN MILLER  
MACHINE CO.**

1216 150th Street • Hammond, Indiana

☐ Please send latest O-M catalog.

☐ Please send complete set of templates.

Name .....

Company .....

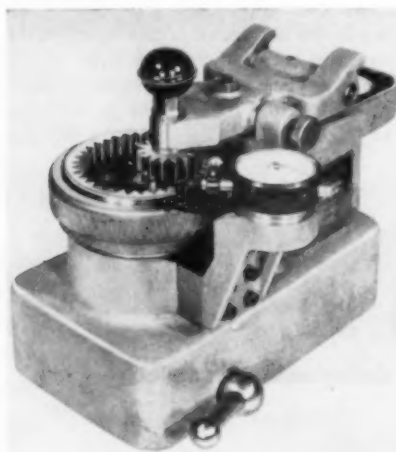
Address .....

City ..... Zone ..... State .....

INDICATE A-12-108-1

## Gear Rolling Fixture

A line of bench-type internal gear rolling fixtures that checks size, eccentricity, and roll smoothness as well as face runout is announced by Michigan Tool Co., 7171 East McNichols Road, Detroit 12. Known as the model 702 rolling fixtures, they are made in three sizes: the model 702-A for gears up to 4 in. OD, the model 702-B for gears up to 7 in. OD and the model 702-C for gears up to 12 in. OD. The rolling fixtures feature heavy cast iron bases, scraped ways and hardened and ground ball ways.



Gears to be checked are loaded in a pot-type chuck mounted on a vertical spindle supported by preloaded ball bearings. The master gear is swung down by a lever-controlled eccentric into mesh with the gear to be checked. Size, eccentricity and roll smoothness are indicated by a 0.0005 in. indicator while the knurled pot chuck is rotated manually. Another 0.0005 in. indicator shows face runout of the gear simultaneously. **T-12-1081**

## Stripper Spring

The Wales Hydra-Spring, utilizing the compressibility of special fluids, has been announced. This Wales Hydra-Spring eliminates many stripping problems by providing up to 600 percent greater stripping pressure than ordinary coil springs of similar size. Such outstanding performance is the result of utilizing the compressibility of a special fluid called Comproil.

In addition to simplifying die design and die making, Hydra-Springs make possible die operations that were previously impossible. For the first time, stripping pressures may be adjusted by simply adding or reducing the volume of Comproil which also provides a resilient action produced by conventional springs.

For complete information, write to the Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. **T-12-1082**

**New!**

**KOEBELITE**

TRADE MARK

## Cemented Diamond Particles



More efficient than conventional single diamond tools  
—with **MUCH LONGER LIFE.**

Reduces set-up time—increases production.

Now ready and proven:  
**Koebelite CDP (Cemented Diamond Particles) Tool for Ex-Cell-O and J & L Thread Grinders, pictured above.**

## KOEBEL DIAMOND TOOL COMPANY

9456 GRINNELL AVENUE  
DETROIT 13, MICH.

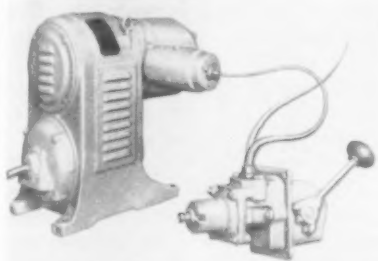
**FIRST to give diamond users  
the advantage of diamonds  
set in powdered metal.**

INDICATE A-12-108-2



## Remote Control

Variations in speed of U. S. Varidrive motors by pneumatic remote control are now possible through a recent development. This control consists of a positioning unit, an air-operated plunger attached to the Varidrive speed changing device and an air valve which remotely controls the positioning unit. Four types of valves are available depending upon the method desired to operate the mechanism: pedal, lever, cam or wheel. The positioning units are designed to operate with an air pressure of either 60 or 100 psi.



Through the use of check valves and control station selectors in the system, the speed of the Varidrive can be changed from any number of control stations. Conversely, any number of Varidrives may be controlled by one station providing they are to operate at the same speeds.

If desired, the pneumatic control may be used to provide speed changes from one preset finite speed to another by one quick movement, requiring the minimum amount of time and effort on the part of the operator. Further information may be obtained by writing to U. S. Electrical Motors, Inc., 200 East Slauson Avenue, Los Angeles 54.

**T-12-1091**

## Slotted Sleeve

The Novi slotted sleeve for simplifying the installation of tool bits in boring bars, tool holders and cutter heads, has recently been placed on the market by Novi Tool & Machine Co., 43043 Grand River Ave., Novi, Mich.

To install the sleeve in a boring bar, one hole the size of the sleeve is reamed part way through the bar and the sleeve held in place by a pin. If permanent installation is required, the sleeve may be soft soldered or brazed in place.

Two more holes are drilled and tapped: one to hold the tool rigidly in place and the other as an adjustment behind the tool itself, preventing the tool from sliding away from the work.

The slotted sleeve can be used not only for square tool bits but also for rectangular tool bits. In the latter case, two sleeves are installed with the slots facing each other.

**T-12-1092**

# **B. Jahn** PRODUCTION PROVED DIES

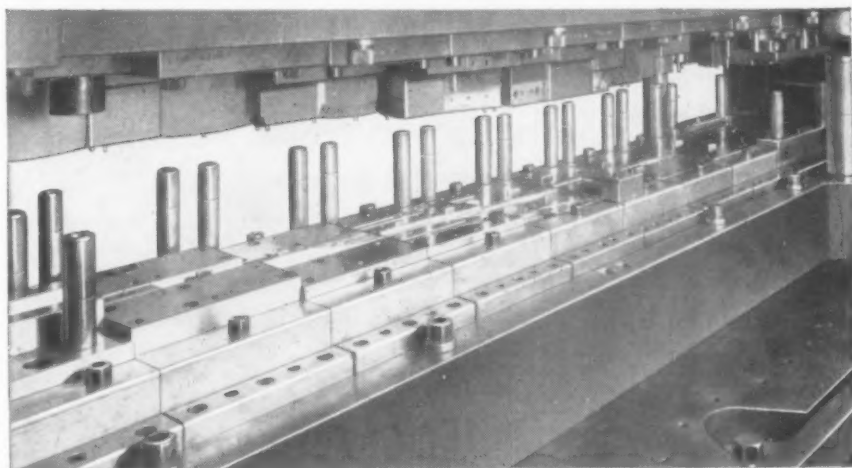
## speed carbine magazines from —

*Production line  
to Battle line*

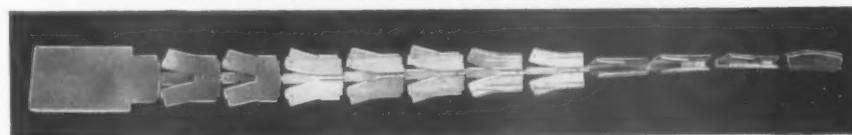


**with new efficiency and economy!**

Another evidence of B. Jahn versatility and ingenuity is this mammoth progressive die — one of the largest of its kind ever built! Measuring over six feet in length, this vital defense tool produces 40 carbine magazines per minute — each identical! Each perfect! Each an example of flawless "proving ground" accuracy!



**CARBINE DIE "SET UP" FOR PRODUCTION RUN**



**CARBINE DIE RIBBON SUBMITTED FOR CUSTOMER APPROVAL**

**THIS — LIKE EVERY B. JAHN BUILT DIE — WAS PRODUCTION PROVED TO ELIMINATE ALL ERROR, ALL CHANCE, ALL UNCERTAINTY AND TO GUARANTEE A FINER DIE PRODUCT!**

In B. Jahn's modern plant, presses run 10 to 50,000 parts for customer's actual assembly line use *before the die is certified PRODUCTION PROVED and shipped!* B. Jahn's guarantee: the die must work in the customer's equipment to his unqualified satisfaction!



— SEND TODAY for the "Story of B. Jahn PRODUCTION PROVED DIES!"



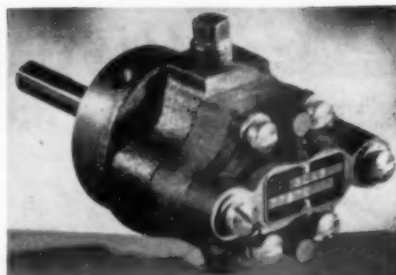
**THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-109

## Hydraulic Pumps

The Webster Electric Co. announces the addition of two series to their line of hydraulic pumps. These gear type pumps, designated as the LAP and LAS series, are designed to suit a wide range of applications, pressure lubricating, oil circulating, oil filtering systems, lift systems, oil transfer, replenishing systems and many others.

The LAP series pumps are available in five sizes with capacities ranging from one-fourth to two gallons per minute at 1800 rpm and 100 psi, and are recommended for pressures up to 200 psi. These pumps are designed for face mounting or wet sump applications.



The LAS series pumps are identical to the LAP except for the addition of an extremely efficient shaft seal, which recommends them for direct, gear or belt drives. They are also available as 115/230-volt motor-pump combination units.

An internal relief valve is available, which can be set between 50 and 200 psi by a simple manual adjustment. This valve, however, cannot be used as a control or pressure-regulating valve.

For more information, write to the Western Electric Co., 1900 Clark St., Racine, Wis. T-12-1101

## Shell Molding Equipment

Powdered Metal Products Corp. of America, Franklin Park, Ill., has announced that equipment and procedures developed by Mr. G. L. Bachner for shell molding will be made available to the foundry industry. It will be possible for foundries to take advantage of the production possibilities of the new process without heavy expenditures for experimental and development work or equipment.

The shell molding process is a recently developed casting method whereby a mixture of sand and thermo-setting resins is baked on a precision pattern to form a permanent, precise, smooth finish mold. The molds are destroyed in pouring.

A completely automatic machine for turning out approximately 20 complete shells from a single set of dies every hour has been developed. Simple and dependable in operation, this machine performs all steps of the shell molding operation, delivering finished shells ready for pouring or storage. The machine is designed to accommodate dies up to 12 x 18 inches.

After dies have been inserted, the sequence of operations performed by the machine is as follows: (1) Heat die by means of electrically heating elements inserted in the die shoe. (2) Dump mixture of sand and resin on heated die from machine hopper. (3) Cure contact surface of the shell by holding the mix in contact with the heated die for a precisely timed interval. (4) Rollover to dump excess sand mixture back into the machine hopper. (5) Oven cure the shell to make it permanent. (6) Eject completed shell.

The Bachner die-molding machine requires a floor area only about 12 by 6 ft and requires no special foundation. Only about 150 square feet of floor space would be required for a complete shell molding setup, exclusive of pouring. 220-volt a-c power is required, together with a compressed air supply.

For further information, write to G. L. Bachner, c/o Powdered Metal Products Corp. of America, 9335 W. Belmont Ave., Franklin Park, Ill. T-12-1102

## 3 times the production capacity for the same tool investment

Old timers still tend to gauge a machine tool's productive capacity by its size and mass, and its accuracy by its cost. These old "rules" do not apply today, in the face of advanced machine tool engineering and modern machine tool building methods. For example, a modern TS56B Sheldon Precision Lathe, weighing around 1000 lbs., will handle the great bulk of production lathe work, and it has "Zero Precision" Timken Taper Roller Bearings—more accurate spindle bearings than found in 90% of the lathes of all sizes.

By scientific distribution of metal (rather than sheer mass) these new machine tools have rigidity and stamina not always obtained in more cumbersome machine tools. Lighter, handier and easier to run, they can be safely operated by the less experienced—by whatever operators available.

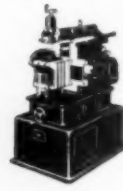
Produced in numbers, in a specially built and tooled plant, Sheldon Precision Machine Tools are low in price. Today for the cost of a single older type tool you can have 2, 3 or even 4 SHELDON units . . . can put 2, 3 or 4 operators to work . . . can double or triple your productive capacity for the same machine tool investment.

Let us show you how.

Write for Catalog

# SHELDON

CHICAGO



**SHELDON MACHINE CO., INC.**

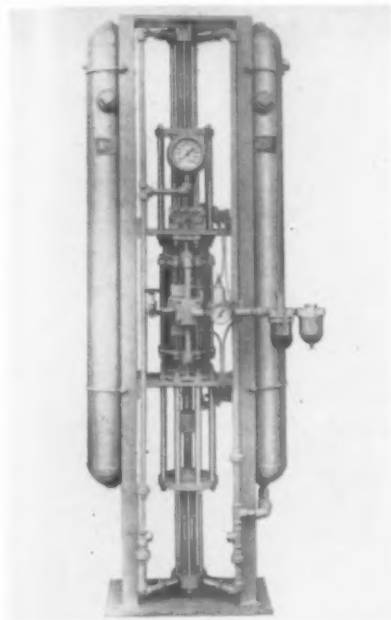
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-110

4229 N. Knox Avenue, Chicago 41, Illinois

USE READER SERVICE CARD ON PAGE 101 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

## Air-Hydraulic Pumps

The series of heavy duty, air-hydraulic pumps and power units has been designed to develop high fluid pressure from low air pressure. Ledeen air-hydraulic units develop fluid pressure directly from plant air supply and are suitable for operation of high pressure cylinders, clamps, valves, actuators and hydraulic presses; for safety installation and high pressure testing; for special hydraulic circuits requiring variable



and adjustable pressure and volume; and for long pressure-holding cycles with quick approach without overheating or churning the hydraulic fluid.

Built as a complete package power unit, ready for installation, these pumps and power units are available in horizontal construction for minimum head room, and vertical construction for minimum floor space. Both pressure and volume are readily adjustable. Normal air pressure is suitable, and very little air is required.

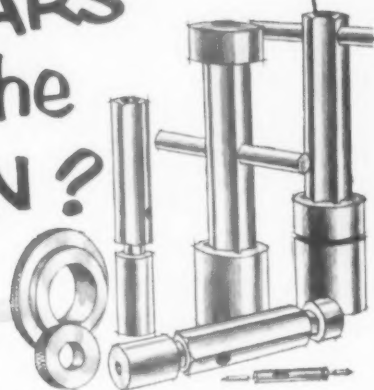
For further information, write to Ledeen Mfg. Co., 1600 San Pedro St., Los Angeles 15. T-12-1111

## Diamond Reclaiming

An electro-chemical process reclaims all types of diamond containing material. Any plant that has used or broken diamond impregnated grinding wheels, saws, drill bits, tools, sludge or swarf from grinding operations, contaminated diamond powder, lapping cloths smeared with diamond dust from lapping operations, can take advantage of this diamond reclaiming service. For further information write the Diamond Dust Co., 15 W. 44th St., New York 36.

T-12-1112

Are you throwing  
**THOUSANDS OF  
DOLLARS**  
into the  
**SCRAP BIN?**



**You can now chrome plate  
worn gages IN YOUR OWN SHOP**

This compact new chrome plating unit is saving real money for leading engineering and manufacturing concerns throughout the country. For instance, here's what Taller and Cooper, Inc., foremost makers of toll collection equipment and builders of electro-mechanical measuring and recording devices, say about their Chromaster installation:

"Within one hour from the time a space was arranged for the unit, the Chromaster was in operation. In the very first day over \$100.00 worth of undersize plug gages that normally would have been discarded were replated and put back in use in our inspection department."

### Same saving applies to other small tools

Normal life of your cutting tools and wear parts can be multiplied 3 to 10 times by this accurate, simplified method of chrome plating right in your own shop. Chromaster deposits chrome with positive uniformity yet the average job takes only 3½ minutes.

# Chromaster

**Write for cost-cutting  
free information today!**



### A Chromaster for every shop

**Model A-20** (shown here) is a 20-amp, bench-mounted unit for the gage room or tool crib; plates up to 10 sq. in.

**Model A-50**, 50-amp, bench-mounted unit for larger shops in plating of cutting tools. Plates up to 25 sq. in.

**Model A-250**, 250-amp, floor-mounted unit for production plating of small parts in greater quantities or larger parts with areas up to 125 sq. in.

Industrial Chrome Division  
Ward Leonard Electric Co.  
15 South Street,  
Mount Vernon, N. Y.

Please send me complete  
information on  
Chromaster industrial  
chrome plating

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COMPANY.....  
ADDRESS.....  
CITY.....ZONE.....STATE.....

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**CUTS**

# ARMOR PLATE

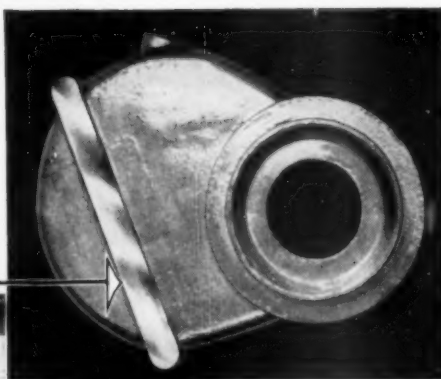
**LIKE BUTTER**



**PHENOMENAL END MILL  
PERFORMANCE  
ON BULLET-PROOF  
TANK ARMOR PLATE**

**PROBLEM: MILL  $23\frac{1}{2}$ " x  
 $2\frac{1}{4}$ " SURFACE OF TANK CARRIER**

The material — the toughest armor plate casting yet devised for military purposes! An impossible operation with other types of cutters tested.

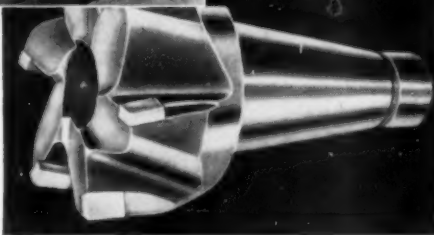


**SOLUTION:**  
**STOCK REMOVAL  $\frac{3}{4}$ "**  
**to  $\frac{1}{2}$ " IN 3 CUTS —**  
Finished surface parallel within .002 —  
**NO REJECTS! A** smooth machine like  
finish at  $10\frac{1}{2}$ " per  
minute.



**AND HERE'S THE NELCO TOOL THAT  
SOLVED THIS VITAL DEFENSE BOTTLE  
NECK!**

The rugged virtually indestructible NELCO Taper Shank End Mill — A 4" carbide tipped cutter that literally chews away half an inch of the toughest alloy Armor Plate America has produced — leaving a smooth, accurate machine-like finish.



Another of the impossible machining problems solved by NELCO tools and the Engineering advice of NELCO Field Engineers. Nelco cutters not only *save money* — they *make money* by performing costly machining jobs in newer ways — better ways!

Write for catalog and details on this husky NELCO TAPER SHANK END MILL and the hundreds of other NELCO Engineered Carbide Tools.— TODAY!

## NELCO TOOLS

*For that Extra  
Edge in Production*

**NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-112

## Power Punch Presses

Two power-operated punch presses, each with a rated capacity of five tons, have been added to the Di-Acro line of precision metalworking machines manufactured by O'Neil-Irwin Mfg. Co., 625 Eighth Ave., Lake City, Minn. Both presses will punch a 4-inch diameter hole in 16 gage (0.062 inch) sheet steel or a  $\frac{3}{8}$ -inch hole in 3/16-inch steel plate.



Called Di-Acro power punch press No. 1 and No. 2, a feature of these machines is their deep throat. Because of this, many operations can be performed on them that could not be done on shallow, bench type presses. Di-Acro power punch presses are similar in construction characteristics to the manually operated punch presses.

Advantages of these new punch presses include a high rate of production, 180 strokes a minute, and minimum operator fatigue on long production runs. They are simple to operate; a foot control frees both the operator's hands for work handling and positioning. All moving parts are housed in a welded steel cabinet. This also results in greater work visibility for the operator. A material chute is built into the cabinet for delivery of slugs and blanked parts.

The flywheel on these machines is driven by a  $\frac{1}{2}$ -hp a-c electric motor, either single-phase, 110-220 volts, or three-phase 220-440 volts. A-C motor is offered.

**T-12-1121**

USE READER SERVICE CARD ON PAGE 101 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



## Broaching Machine

The Lapointe Machine Tool Co., Hudson, Mass., has designed and built a new mechanically driven horizontal broaching machine. Outwardly it has much the same appearance as the conventional horizontal machine, but here the resemblance ends.

The important feature is its operating speed. It will broach at a speed of 150 fpm or more, to remove a large amount of material in the shortest possible time. It is rugged, heavy, and rigid and can be equipped with drives of up to 200 hp for powerful, high-speed broaching.



Developed originally for the broaching of anchor slots in compressor rotor discs and turbine wheels for jet engines, at cutting speeds below 50 fpm, this machine will now also be of great interest to the automotive industry because of its broaching speeds in excess of 150 fpm.

Offered with strokes ranging from 66 to 200 in., this machine is built around a special type of electric drive which has been developed to give this unit its flexibility. The driving means is through a herringbone rack, necessary bull gear, gear reducer and direct current motor. This is fed by its own power unit of the necessary capacity to give this machine its wide range of broaching speeds. The main slide and all other sliding members subject to scoring are lined with natural phenolic plates sliding on heat-treated Meehanite ways.

On its reciprocating table, there can be mounted whatever type of indexing may be required to suit any size or shape of discs and wheels now being made for jet engines. The power required to operate the clamping fixture is, of course, hydraulic. Suitable hydraulic units are built within the base of the machine, but the actual operation of the main work slide is done mechanically.

The machine also has dual speed through its own control panel, a means to operate at any speed for any part of the stroke, and at any other speed for the remainder of the stroke when required. An example of the helpfulness

of dual speed is where long roughing and finishing operations are required. It has been found that a higher production rate is reached by roughing at 50 fpm, then obtaining the finish required at 30 fpm or less, in the same stroke. Through its control panel this feature can be accomplished automatically by simultaneously setting the dial for any roughing speed and any finishing speed, and the limit-switch on the slide does the rest.

It has been found that on some rotor discs, regardless of the amount of stroke available, the anchor slots can-

not be broached in one pass without undue distortion. This machine can be set so that the roughing section of the broach is allowed to produce its work automatically, going all around the wheel at high speed, and after the last roughing cut the machine will then pass only the finishing section of the broach again all around the wheel—thereby finishing the slots to the required accuracy.

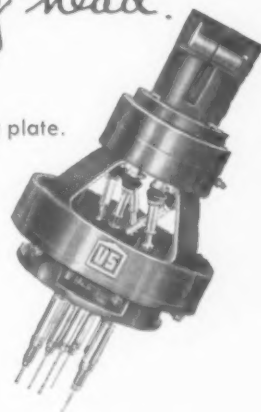
T-12-1131

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## COMPARE THE PRICE.... AND PERFORMANCE.....

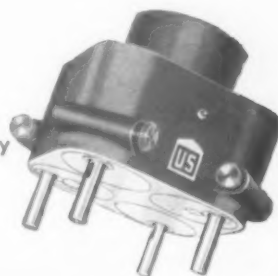
*and you'll rely on us for any type of multiple spindle fixed center, adjustable or individual lead screw tapping head.*

Universal joint with slip spindle fixed locating plate.



Two spindle head unit—one spindle fixed, the other spindle adjustable for the fixed positions.

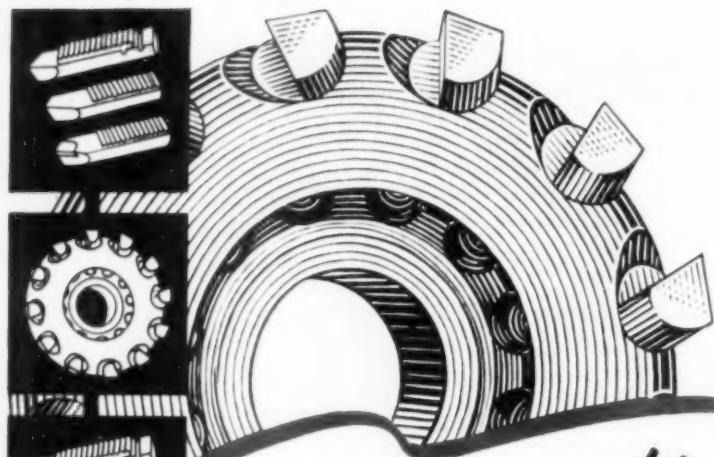
Single eccentric type for equally spaced holes on bolt circles.



UNITED STATES DRILL HEAD CO.  
CINCINNATI 4, OHIO

SINCE 1915

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*All Lovejoy Blades for  
Type "A" Milling Cutters  
are interchangeable from  
4½" to 24" in diameter*

... and this applies to  
every "A" cutter ever made!

Lovejoy Type "A" face milling cutter blades offer unsurpassed economy — 1) they are interchangeable throughout the complete range of housing sizes, 2) H.S.S., carbide and cast alloy blades are interchangeable in every housing, 3) every blade will fit every Type "A", even if you have housings 30 years old, 4) only a minimum of stock must be removed when sharpening, 5) a large percentage of every blade is usable; 6) there is no need to carry a large inventory, as Lovejoy can supply blades promptly from stock. For superior performance, plus maximum economy, use Lovejoy Type "A" for every face milling job.

Write for free catalog!



131 MAIN ST., SPRINGFIELD, VERMONT

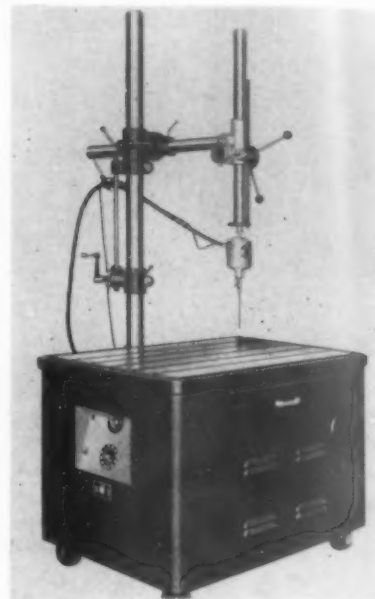
**LOVEJOY  
TOOL COMPANY, INC.**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-114

## Broken Drill Remover

This metal disintegrator model has the largest cast iron "T"-slotted ground work-plate available on this type of equipment, 28½ x 39½ inches, which prevents large castings from hanging over the side or end of the machine and liquid coolant running on the floor. The large plate also simplifies setup and saves time and expensive holding fixtures on job setups.

Castings too large for the work-plate can be worked on the floor or a radial drill press by using the auxiliary ground terminal and chucking the head into the radial drill press.



A screw-feed is used for working the radial arm up and down the column. The radial arm is adjustable through 360 deg in all planes for faster job setup and allows the disintegrating head to operate at any predetermined compound angle or position.

The Electro Arc is so manufactured that the arc is made only on the positive peak of the sine wave, insuring maximum disintegrating power at all times. Combining this head with the positive automatic 20-inch travel gravity feed eliminates lost cutting time due to interrupted disintegration.

This patented head, which is interchangeable and is used on all models and all sizes of Electro Arc disintegrating machines, is responsible for the machine's ability to disintegrate all metal-capable of conducting electricity and the high cutting speeds obtained in the removal of broken taps, drills, reamers, pins, screws, studs, etc., from any kind of metals, including aluminum, without damage to either the original threads in the hole or to the workpiece. Made by Electro Arc Mfg. Co., P. O. Box 448, Ann Arbor, Mich.

T-12-1141

The Tool Engineer

## Concentric Grinder

Workpieces such as anti-friction bearing races or rings for precision mechanisms can now be OD ground within extremely close limits for concentricity. This is made possible by a method of work holding incorporated in the new Landis Tool Co. 4-inch concentric grinder.

This method reduces a large amount of the out-of-roundness which may be present in the bore, to produce roundness of the OD within closer limits than the bore. When grinding grooves or race-ways, parallelism with the face is assured within very close limits because of the work holding and driving method.



Although the primary application for this machine is in the bearing industry for grinding race-ways to super precision tolerances, there are many possibilities for its use in other types of manufacturing. Wherever concentricity, squareness, roundness and high production of ring-type parts with either flat or profile shapes are needed, this machine will grind parts having super precision quality with no increase in time over that ordinarily required to grind parts having only commercial tolerances.

The 16-inch diameter grinding wheel is driven from a 3-hp motor. Landis Microsphere spindle bearings are used in both the wheel head and work head. Hydraulic rapid infeed and continuous hydraulic slow grinding feed are used to position and feed the wheel during the grinding cycle.

The work holding principle utilizes a revolving face plate which is a permanent magnet. The workpiece revolves about an arbor which has two wear-resistant strips set in it lengthwise. In operation, the work arbor is moved to a position aside, and near the center of the revolving face plate. The two wear resistant strips are spaced above and below the horizontal center line on the side of the bore nearest the grinding wheel. In effect, an internal V-type support is provided.

An automatic loader is available which loads and unloads the work arbor, and also moves it into and away from grinding position.

**T-12-1151**

## Rolling Large Diameter Threads on 5" Rocket Motor Nozzle



*Threading 4 to 6 Parts per minute*

The Reed Thread Roller has overcome major threading problems in the producing of  $4\frac{3}{4}$ "—12 threads on 5" Rocket Motor Nozzles. With the previous production methods, difficulty had been encountered in obtaining squareness and 100% inspection was required for accuracy and smoothness.

The Reed A32 Cylindrical Die Thread Roller produces accurate threads that are much smoother and have a high degree of surface finish. Squareness of the thread with the shoulder is held to within one-half of the required tolerance with simple tooling. Production is at the rate of 4 to 6 threaded parts per minute.

Only spot checking of the threads is now required, and inspection costs have been reduced over 65%.

Send us specifications of your requirements and let us supply you with complete information.

**REED ROLLED THREAD DIE CO.**

Manufacturers of  
THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS  
Worcester, Massachusetts, U. S. A.

TE-025

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-115

# NOW 5 PLANTS

on industry's doorstep to expedite your needs for quality tubular and split rivets, rivet-setting machines and special cold-headed fasteners. Write for an important new brochure, "THE MILFORD METHOD", describing Milford's latest contribution to industrial progress... a complete service integrating fastener research, design and engineering with manufacturers' production.

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1118 W. River St. Elyria, O.



## PENN DIVISON

38 Platt St. Hatboro, Pa.



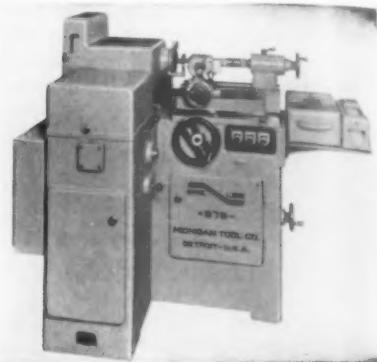
the **MILFORD** RIVET & MACHINE CO.

the name to rivet in your memory  
for fasteners

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-116

## Lead Checker

A model 876 Sine-Line hob and worm lead checker is announced by Michigan Tool Co., 7171 E. McNichols Road, Detroit 12. In addition to inspecting leads on hobs and worms, the model 876 will check hob flute spacing and thread spacing on multiple thread hobs. An auxiliary fixture can be mounted on the machine in place of the indicator head to check hob pressure angle.



The lead checker can be hand-operated or motor driven. Automatic recording equipment can be provided to work in conjunction with the checking machine.

In checking leads, the rotation of the hob or worm spindle and translation of the indicator table parallel to the hob spindle is effected by a sine bar table on the machine base.

A precision ground master rack mounted on the sine bar table engages a pinion that drives the hob spindle through hardened and ground master change gears. The indicator table, which is mounted on hardened and ground ball ways, is held against the sine bar with constant pressure.

The machine is set up to check a given lead by selecting change gears according to a table included with a formula sheet, and calculating the correct sine bar setting. Deviations from true lead are shown in ten-thousandths of an inch.

Index plates are used to check hob flute and thread spacing. Two table drive speeds are provided. An indicator table rapid return mechanism speeds checking operations.

The lead checker has a hob capacity of from  $\frac{1}{4}$  to 8 inch diameter. Maximum spreads of centers is 13 inches. The machine will check right- or left-hand leads from zero to 7.2 inches. It is powered with a  $\frac{3}{4}$ -hp 1800-rpm motor.

T-12-1161

USE READER SERVICE CARD ON PAGE 101 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



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& MANUFACTURING CO., INC.

19645 JOHN R STREET  
DETROIT 3, MICHIGAN

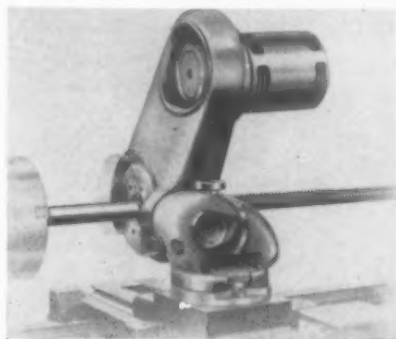
INQUIRIES PROMPTLY ANSWERED

## Thread Cutter

A thread cutting and worm cutting machine, when installed on a standard lathe, increases speed in cutting threads and worms by nine times over that of lathe cutting by the methods generally used; and two times as compared with thread milling.

On a recent trial covering 1 1/4-inch diameter SAE 1335 steel 4 threads per inch, ACME, no tolerance was found in the lead in 42 inches or 168 threads of cutting. In other words, the exact lead was maintained.

The novel feature of this equipment is that the actual cutting is done by means of a tool which moves around the workpiece eccentrically at high speed, in a single continuous operation.



The equipment cuts long standard vee threads, ACME, buttress and rounded threads, and, within close limits, modified square threads.

Threads cut with this equipment are more exact in pitch than those produced under equal machining conditions on a twining basis. Pitch errors produced by the torsion of a workpiece, which are unavoidable with die thread cutting machines or long thread rolling methods, are non-existent with this equipment.

The threads are produced with feeds that are well synchronized in relation to the thread surfaces, which reach almost grinding quality. Tearing of the flanks, which is a danger in the usual slow, cutting process, and smearing of the workpiece, are eliminated with high-speed cutting (velocities are between 800 to 2000 feet per minute, depending on type of material worked). Formation of the built-up edge is eliminated. All flanks, even in soft steel or aluminum, show a high polish.

Heat produced by high-speed cutting is mostly eliminated with the shavings. Sufficient air passes the tool in its path to keep it cool, although in producing guide or measuring spindles with exact pitch, cooling of the workpiece is sometimes necessary.

Manufactured by National Threading Machine Co., 126 Market St., Paterson, N. J.

T-12-1171

# PUMPS

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WRITE FOR CATALOG

INDICATE A-12-117-1

INDICATE A-12-117-2

## Stamping Press

This high speed automatic stamping press of 30-ton capacity with feed rolls built integral embodies several new features. Both ram and connecting link are of high strength, light alloy material approximately 35 percent the weight of the cast iron alloys generally used. The press ram is contained on a multiple of ball bearings, operating in hardened and ground tool raceways, insuring accurate alignment at all times.

Adjustable roll lift in ten steps is available by means of palm knob for varying thickness of material. Feed rolls built as an integral part of the machine give closest relationship to the die, infinitely adjustable through over-running clutch from 0 to 12-inch feed. Pitman ball retainer nut locks against the full area of retainer nut thread. Square pillar blocks are cross bolted



for journal bearings with replaceable inserts. A heavy band brake is anchored

to the clutching arm to eliminate brake drag in automatic operation.

Another feature of this automatic press is its wide versatility of loading and stamping materials ranging from 0.002-inch thick aluminum foil, plastics, gasket materials, paper used in book construction to heavy metals within the range of its 30-ton capacity.

The machine is available with either air or shot pin clutch. Conventional bolster areas, shut heights and ram adjustments are standard. The speed is infinitely adjustable from 110 to 450 strokes per minute. The C-type reinforced fabricated steel frame, stress-relieved, makes platens completely accessible on three sides. In automatic operation, the coil stock feeds from the rear through the open back.

Further information is available from Precision Welder & Flexopress Corp., Cincinnati 10. **T-12-1181**

## NEW boring tool set

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*Quick Change*

**P. D. Q.**

(Portage Double Quick)

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Featuring the new...  
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*If you have not seen this... proved on the job set... write for details NOW.*

**PORTAGE DOUBLE QUICK TOOL CO.**

1054 Sweitzer Avenue

Akron 11, Ohio

## D-C Arc Welder

A 200-ampere, engine-driven d-c arc welder with a 60 percent duty cycle has been announced by the General Electric Co.'s welding department.

Designated as type WD-42AGW, the welder has a current range of 40 to 250 amperes, and can be used with a variety of electrode sizes for repair, maintenance, and construction work.



Consisting basically of a G-E type D42 generator and a Wisconsin air-cooled engine, it is designed to fit crosswise in a standard pick-up truck. Optional equipment includes a trailer equipped with fittings for pressure lubrication.

Forced ventilation keeps internal temperature within safety limits when the welder is operated on a 60-percent duty cycle at rated load. In addition, tests indicate that heavy overloads for short periods do not produce harmful results.

Maintenance-wise, either the generator or engine can be removed easily for overhaul, and replaced by a standby unit. Since the engine is air cooled, coolants or anti-freezes are not required.

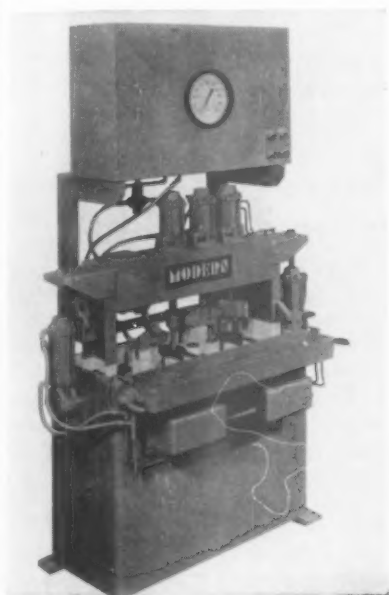
A vacuum-type device saves gasoline by idling the engine when welding is not being done. **T-12-1182**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-118

## Pressure Tester

A pressure testing machine that detects and locates leaks in gas passages in cast iron automotive engine exhaust manifolds is announced by Modern Industries Engineering Co., 14230 Birchwood, Detroit 4.

In operation manifolds are manually loaded into the test area of the machine where the exhaust gas areas are sealed in three planes by rubber-faced, air cylinder-controlled sealing pads. The resulting pressure buildup in the air cylinder control circuit when the pads contact the manifold causes an automatic air test cycle to start. The manifold is then charged with a specific volume of air trapped in the gas areas.



Pressure loss over a given preset test time is indicated by a gage in the head of the machine. Leaks in manifolds that show excessive pressure loss are located by immersing the head in a built-in illuminated water tank. The manifolds are lowered into the tank by air cylinder controls. The tank is finished with a special paint that provides maximum light reflection to the part.

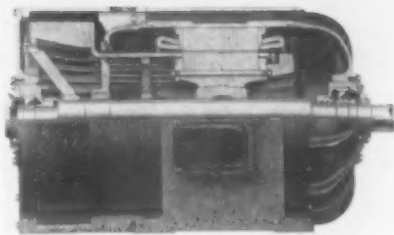
The manifold is raised from the immersion test by the air cylinder controls and can then be marked with chalk indicating areas that should be impregnated with suitable material to pass pressure test specifications.

**T-12-1191**

## High-Slip Motor

A totally enclosed, fan-cooled, high-slip induction motor, designed for use in acceleration of high-inertia loads such as punch presses, centrifuges, hoists, etc., has been announced by the General Electric Co.'s small and medium motor department.

Designated as type KRX, the motor is as much as 30 percent smaller and



40 percent lighter than conventional totally-enclosed fan-cooled high-slip motors. The space and weight reduction is the result of the motor's new extended-bar design which provides efficient dissipation of the increased

heat generated by high-slip motors.

In the motor, low-resistance rotor bars are extended on one end and pass through a rotating baffle plate. Beyond the baffle plate, the bars are brazed to strips of high-resistance metal, shaped to form a radial-blade fan. These fan blades, themselves, provide the higher rotor resistance necessary for high-slip characteristics. Thus, most of the rotor heat develops where there is a direct transfer to the cooling air, i.e., outside the motor enclosure.

The type KRX motor is available in 30 to 150 hp at 900 and 1200 rpm, 5-8 and 8-13 percent slip. Voltage ratings are 220, 440 and 550. **T-12-1192**

Across the continent 39 saws cut Milne steel to your order

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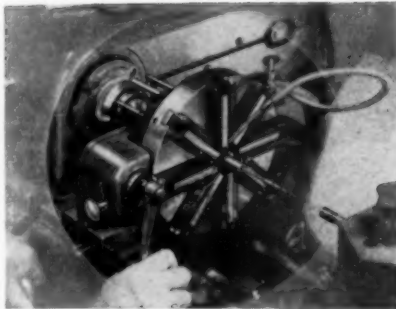
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-119



## Indexing Head

The Roto head is an accessory just introduced for multiplying small lathe production of duplicate parts. It is designed to fit any engine lathe with between 9- and 12-in. swing and can be installed with no lathe alterations.

The Roto head uses the principle of the Swiss type automatic machines, possessing eight different single-point tools mounted in slideable, spring-loaded tool holders. The tool holders are equally spaced around the face of a rotating head, each tool pointing towards the lathe axis. The head is



mounted on the cross slide dovetail, replacing the conventional cross slide.

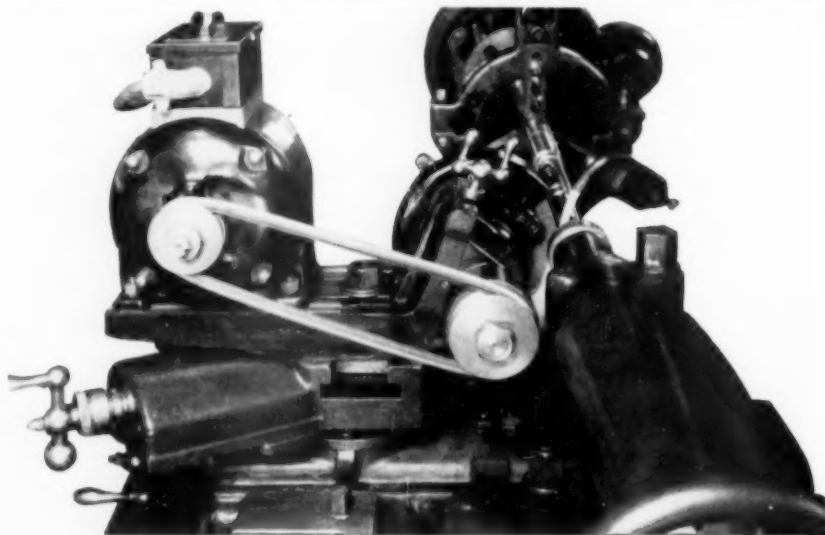
Tool infeed is actuated individually by rotating a hand crank. A cam at-

tached to the crank advances the tool to its full cutting depth by contacting either of two buttons behind the tool slide. Each button is equipped with a micrometer adjustment. Two diameters are thus possible for each cutting bit. As the crank continues to rotate, the head automatically indexes to the next station, the cutting cycle repeating successively with each tool slide. By varying set ups of the different bits, up to 16 different diameters can be produced on one job.

All longitudinal feeds are made by conventional carriage travel. Stops provided for each station automatically index and limit longitudinal feeds, permitting a total of 23 shoulder lengths and cut off.

Work is supported at the tool point by three universally adjustable rollers. Rigidity of support is so great that 1-in. bar stock (maximum capacity) can be reduced to zero in one pass.

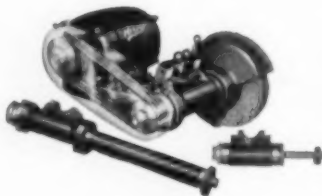
For further information write General Roto Co., 8914 Melrose Ave., Los Angeles 46. T-12-1201



$$L + 4KX = ?$$

The symbols in the above equation represent your Lathe and a "HISEY" type 4KX Precision Grinding Head. The answer is truly a precision grinder.

Illustration at left shows the 4KX 1 H. P. Grinder with external grinding head mounted, including 10-inch diameter wheel.



The special internal spindles are interchangeable with the external spindle, permitting a wide range of external, internal and surface grinding operations.

"HISEY" Precision Grinders are furnished from 1/4 to 10 H. P. capacity. The V-belt drive affords the most efficient and economical speed; permits rapid speed changes as required.

They can be mounted on a boring mill, planer and other machine tools for production or tool room work.

**Write for catalog 72 EC today!**

**Hisey** THE HISEY-WOLF MACHINE CO.  
CINCINNATI, OHIO  
Divisions of The Cincinnati Machine Co.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-120

## High-nickel Alloys

High-nickel alloys, rolled to precision tolerances and ultrathin gages are now available from the Industrial Div., American Silver Co., Inc., 36-07 Prince St., Flushing 54, N.Y.

These metals (which include temperature compensation, low expansion, high permeability, glass sealing, and electrical resistor alloys), are now rolled to specifications by this company in strip up to eight inches wide and down to 0.0005 in. thin, to tolerances as close as  $\pm 0.0001$  in. The strip is available in any quantity.

High-nickel alloys processed include: nickel-iron, nickel-chrome, nickel-cobalt-iron, and nickel-molybdenum-iron. The ultrathin, high-precision metal strip is produced on precision 2-high, 4-high, and Sendzimir rolling mills; on precision gang slitters; and through continuous atmosphere annealing lines.

Typical uses for high-nickel alloys include: speedometers in the automotive industry, navigation instruments in the aviation and marine industries, telemetering devices in the electric light and power industry, thermostats in the household appliance industry; magnetic shields in the instrumentation industry, dynamic balancing machines in the machinery industry, locator parts in the radio industry, and audio transformers in the telephone and telegraph industry. T-12-1202

USE READER SERVICE CARD ON PAGE 101 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



## Dust Collectors

To meet the requirements of heavy duty, continuous grinding and other high dust volume applications, the Torit Mfg. Co. is producing several models of dust collectors with hopper bottoms and special release valves. These are available in both cabinet and cyclone types.



When the dust is of a grainy nature a flexible diaphragm valve is recommended, primarily because of its speed of operation. This Torit valve is of the Syntro-Mucon flow control type. It can be changed from a fully closed to wide open by merely moving a lever through 180 deg. Nylon is used for the diaphragm. This valve will stand hard service and may be replaced at low cost in a few minutes.

When dusts are of sharp materials, such as shavings, chips, etc. from milling operations, a Torit plate valve is recommended. This type is hinged to the bottom of the hopper, and is faced with rubber. A simple, adjustable locking lever holds it securely against the hopper bottom and prevents air leakage.

Full information about these Torit Dust Collectors and release valves may be obtained by writing the Torit Mfg. Co., 281 Walnut St., St. Paul 2, Minn.

**T-12-1211**

## Portable Yard Ramp

Magnesium Co. of America, East Chicago, Ind., announces the addition of a portable magnesium yard ramp to its line of materials handling products.

The yard ramp has been designed to solve a materials handling problem frequently occurring in industry today. This problem is to load and unload freight cars from the ground level because no dock facilities are available or existing facilities are congested.

The portable yard ramp may be obtained in five standard sizes, all of which are 30 feet long but vary in widths of 60 and 70 inches. Capacities range from 6,000 to 16,000 pounds, capacity being the combined weight of the load and the materials handling equipment transporting the load over the yard ramp.

Quarter round safety curbs with inner edges rounded to protect equipment are used along the top sides of the ramp. The ends of these curbs are capped with an end casting which tapers to each corner of the ramp. Bridge type underbracing offers maximum strength with minimum weight. A large wheel on each side of the ramp perfectly balances the weight, permitting one man to easily push and roll the ramp to the desired position for use.

The ramp in use is positioned in front of the freight car door and one end is raised by means of a hydraulic lifting mechanism. The lower end of the ramp is on the ground which prevents the ramp from being forced out of the car during loading operations.

**T-12-1212**

## Drill Point Gage

F. T. Griswold Mfg. Co., Devon, Pa. are now offering the drill Point-Chek, an optically precise gage for inspecting drill points in a matter of seconds. With this simple hand tool, new drills and re-sharpened drills can be inspected to make certain that drill lips have been ground to equal angles and equal lengths so that holes of accurate size



and more holes per drill can be produced. The drill point-chek assures both more accurate drilling and longer tool life since correctly ground drill points are concentric, reduce wear, require less regrinding.

Even slight differences between lip angles or between lengths of cutting edges can be easily detected with the instrument. The error in angles is determined accurately by a micrometer barrel graduated in degrees. Any included angle of point, up to 145 deg. may be measured and any two-lip drill, whether straight shank or tapered, right or left hand, from No. 80 up to one inch, can be gaged. The accuracy of drills ground with unusual angles for special drilling purposes or with angles for countersinking, counterboring or chamfering may also be determined.

**T-12-1213**

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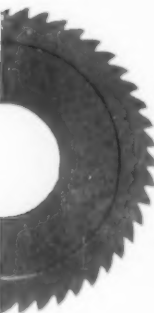
**MORTON MACHINE WORKS**

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DETROIT 20, MICH.

INDICATE A-12-121

## PRECISION CIRCULAR CUTTERS

### MEYCO CARBIDE TIPPED



### MEYCO SOLID CARBIDE

MEYCO saws and cutters in various diameters and thicknesses can be furnished to your individual specifications. MEYCO cutters have earned an enviable reputation where long tool life and precision are a must.

Increase production in your slotting, venting and slitting operations by using MEYCO cutters. Please furnish complete specifications and quantities desired when requesting prices and indicate material to be cut.

Manufacturers of precision tools since 1888

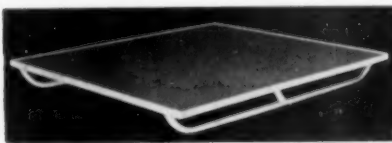


**W. F. MEYERS CO., INC.**  
BEDFORD, INDIANA

INDICATE A-12-122-1

## Steel Pallet

An all-purpose, heavy-duty tubular steel pallet, lighter-than-wood construction and priced competitively with wood pallets, is being placed on the market by the Econoweld Co., 1805 Webster St., Dayton, Ohio.



Two or more stout tubular skid runners are welded and braced to a rectangular angle-iron frame which encases and protects a tough laminated wood deck. The sled-like construction permits easy movement over uneven surfaces and obstructions, making the pallet adaptable for handling materials in storage racks of any design, in conveyor systems, and all phases of production and transportation.

Weight is several pounds under that of a wood pallet of the same deck dimensions and load potential. Designed for compact stacking and easy handling, the pallet affords no chance of injury from splinters or projecting fastening devices.

T-12-1221

## Improved Cutting Oils

The Atlantic Refining Co. announces additions and improvements in its line of non soluble cutting oils which it states will provide reduced friction, superior cooling, antiweld metal wetting characteristics. A feature of the oils is their transparency, from light to heavy grades, one of the results obtained from the use of a new additive.

Atlantic Cutting Oils 20 through 45 have been devised so that they do not develop offensive or rancid odors, and will not indelibly stain hands or clothing. Their cutting efficiency has been improved through the use of a new additive.

The company's soluble oils are water-emulsifiable products, which are used in grinding and cutting operations. Atlantic Soluble Oil 1 is designed for ordinary work. Atlantic Soluble Oil 4 contains extreme pressure characteristics which make it suitable for heavy-duty work. Both oils are excellent coolants and rust preventives.

Atlantic has pioneered the development of a method used to select the proper Atlantic cutting oil based on actual job requirement. Knowing the metal to be cut, tool characteristics, feeds and speeds, with normal tool geometry and machine set-up, the company has prepared a cutting oil selection chart which will indicate the oil needed in terms of cutting units.

T-12-1222

Get More Production  
from your Machines  
with



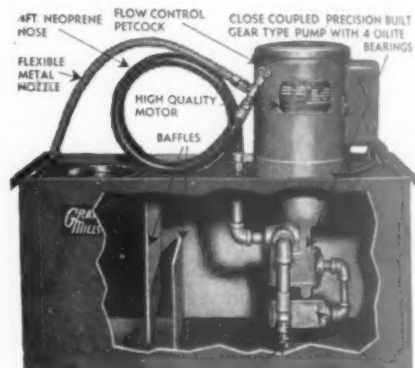
### PORTABLE COOLANT SYSTEMS and PUMPING UNITS

1 GPM TO 70 GPM  
UP TO 70 PSI



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They can be installed in a few minutes, are modern in design, and of heavy duty construction with built-in automatic pressure relief valve on gear pumps.



CONTAINER  
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Sturdy high pressure gear models . . . smooth high volume centrifugal types in 1/25 to 1/2 HP ratings, 1 gal. to 70 g.p.m. with tank capacities from 5 to 38 gals. Also immersion type centrifugal pump and motor units.

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WRITE FOR NEW CATALOG SHOWING SELECTION CHART TELLS THE RIGHT PUMP OR COOLANT SYSTEM FOR THE JOB.



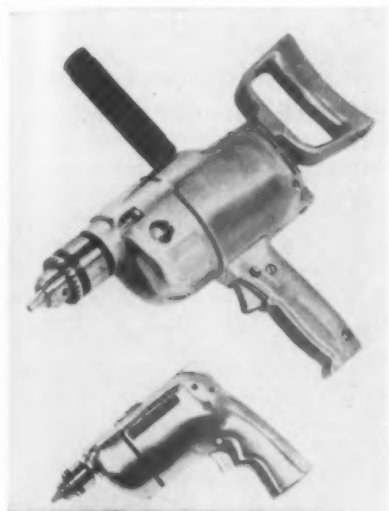
**GRAYMILLS CORPORATION**  
3739 LINCOLN AVENUE • CHICAGO 13

INDICATE A-12-122-2

The Tool Engineer

## Electric Hand Drills

Two electric hand drills, a general duty type with quarter-inch chuck and a half-inch capacity special duty model, are now being introduced by the Porter-Cable Machine Co., Syracuse 8, N. Y. According to the manufacturer the tools are a composite of the most popular drill features selected in an extensive survey of drill users.



Both models have spindle ball-bearing construction to absorb radial load and end thrust, Jacobs gear-type chucks for slip-proof gripping of bits, and powerful Universal motors. Housings are satin-finished die-cast aluminum with aircool vents located to avoid covering by hand.

The general duty model 107 with 1/4-inch chuck is designed for all-around intermittent use. It has a full-hand pistol grip with push-button lock. Compound reduction gears deliver maximum power to the spindle for more efficient drilling. The idle speed of 2000 rpm is ideal for drilling in wood, metal, and compositions.

The special duty model 109 with half-inch chuck is built for intermittent production use where plenty of power is needed to penetrate metals and other resistant materials, as well as wood. A spade handle at rear can be changed to vertical or horizontal position, or removed entirely. The lower full-hand grip has a trigger lock-button switch. A removable auxiliary handle which can be mounted on top or side of drill enables the operator to increase pressure and control torque. Tool without rear handle is 10 3/4 inches long, 3 3/4 inches wide.

**T-12-1231**

USE READER SERVICE CARD ON PAGE 101 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

# Backstand Belts Triple Production!

**Three times as many steel guides sanded per hour using ARMOUR Backstand Belts!**

In sanding beveled edges of a steel guide for vending machines, a prominent company\* decided to use backstand belts instead of set-up wheels. The switch *increased production from ten to thirty guides per hour!* Here is more proof that Armour backstand belts are more efficient, more economical than set-up wheels.

Belts are only one of the many forms of coated abrasives available to you from Armour. There are more than 30,000 different varieties in grit size, backing, etc. We have sheets, discs, rolls, tubes—and specialty sizes to meet your specifications. Your industrial supply distributor will be glad to tell you about this complete Armour line. Call him today!

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-123



## Fork Truck

Several improvements feature the Yardlift 20, pneumatic fork-lift truck of 2000-lb capacity announced by Clark Equipment Co.

Smooth tilt action and upright stability are improved by twin double-acting tilt cylinders, which replace the single cylinder formerly used.



Honed cylinder surfaces assure positive seal and long packing life. Piston-type construction minimizes leakage and maintenance. Rods are effectively protected from dirt by rubber dust boots. A convenient instrument panel on the new model is positioned for easy reach and best visibility. It includes all recording dials, ignition switch and starter button.

Clark's quick-change clutch, standard on most of its larger models, is another improvement in this model. The Elliott-type steering axle is an important feature of the Yardlift 20. The axle is pivoted in rubber torsional bearings to minimize road shock and at the truck frame center to permit constant wheel contact during travel over uneven surfaces.

Made by Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.  
**T-12-1241**

## Distribution Transformer

A completely enclosed, non-ventilated dry-type distribution transformer for service on secondary circuits rated 600 volts and below has been developed by the Westinghouse Electric Corp. Designated as type E, the transformer supersedes the type AJR line of dry-type transformers.

The enclosed distribution transformer utilizes Hipersil cores and class H silicone insulation and operates at 120 deg C rise. Both high and low-voltage leads are brought to Micarta R laminated plastic terminal boards at the bottom of the case. Since the temperature of the terminal compartment is less than 30 deg C, standard insulated cables can be

used for wiring through conduit. Conduit knockouts are located at the bottom of the case walls.

In addition to the 3-, 5-, and 10-kva AJR sizes superseded, the type E will also be built in 15-, 25-, 37½-, and 50-kva ratings.

The three smaller sizes are designed for indoor or outdoor service and wall mounting. Ratings above 15 kva, also for both indoor and outdoor service, are designed for floor or platform mounting, though the 15- and 25-kva units can also be wall mounted.

The enclosed distribution transformer is approved by the Underwriters Laboratories.

For further information, write Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30.  
**T-12-1242**

## Auto-Collimator

The projection angle Dekkor is an auto-collimating unit which shows on a convenient projection screen direct readings of squareness of a reflecting surface placed into the path of its light.

It differs from contour projectors in that it does not show the image of the outline or surface of the object being tested, but reflection from its surface produces an image of a built-in scale or graticule showing directly the squareness of the surface to be tested. It is possible to inspect simultaneously a number of surfaces and determine thereby their parallelism to each other.

The projection angle Dekkor is a rapid inspection device for high volume production. Suitable reflectors are available for otherwise difficult inspection jobs, such as: squareness of holes to reference surfaces, parallelism of



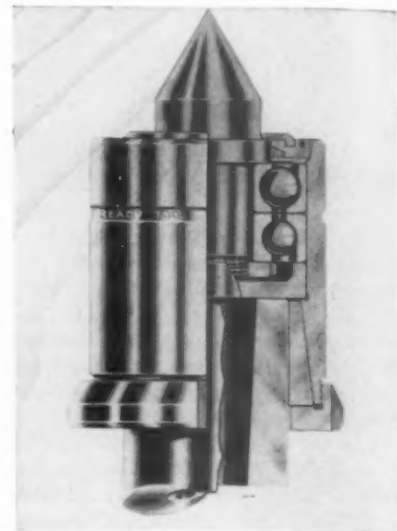
two or more bores, parallelism of two or more planes, and numerous other applications where reflectors can be placed on the surfaces to be checked.

This instrument is particularly adapted for production inspection of rocket motors, ball bearings, piston rings, seals, and comparable products requiring parallelism of greatest accuracy.

It is available from Engis Equipment Co., 431 South Dearborn St., Chicago 5.  
**T-12-1243**

## Spindle-type Center

A Red-E heavy duty anti-friction, superaccurate center has been designed for manufacturers who must turn and grind large parts, weighing up to 12 tons. It features a large special collet arrangement that clamps over the outside diameter of the tail stock quill, and is particularly suited for the heavier



feeds and carbide tools. Heavier work can now be handled with ease and precision, and still maintain close tolerances. A minimum of overhang assures the utmost in rigidity, permitting the operator to set up his work very close to the tail stock.

The Red-E outside spindle type anti-friction bearing center features a duplex arrangement of angular preloaded precision bearings, assuring smooth operation, free from any end or side play. All chatter and wobble is eliminated. Accuracy is guaranteed.

Lubrication is self sealed and will never escape. In spite of the heavy duty requirements demanded of this center, the high-speed steel points will give long service. For further information write to Ready Tool Co., 554 Iranistan Ave., Bridgeport 5, Conn.  
**T-12-1244**

USE READER SERVICE CARD ON PAGE 101 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



## D-C Power Supply

Rapid Electric Co., 2881 Middletown Road, New York 61, has announced a line of selenium rectifier power supplies designed for installation at individual work stations. Each of the two models currently in production, a 300-watt unit and a 500-watt unit, operates from a 115-volt 60 cycle-line, and furnishes from 90 to 135 volts of filtered d-c output. Output voltage may be varied in approximately equal steps by a 5-position tap switch. Output ripple is less than 5 percent at full load. Both units are rated for continuous duty at full load. Overload protection is built into the circuit.



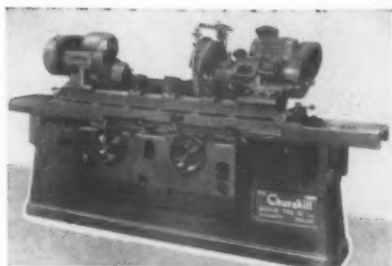
Each unit is exceptionally light, compact, and easy to install. The 300-watt model weighs 6 lb, measures 5 x 6 x 7 inches; the 500-watt model weighs 8 lb, measures 6 x 7 x 8 inches. The steel case may be mounted on a bench or on the wall, and will be furnished either with an input and output conduit box, or with a line cord input and polarized plug outlet.

These power supplies have many applications on manufacturing assembly lines, at test and inspection stations, and in the laboratory. They can be used to furnish d-c power for magnetic chucks, small d-c motors, testing d-c switches, relays, and controls, remagnetizing meter field magnets, etc. **T-12-1251**

## Plain Grinding Machine

The Churchill Model BW is a plain hydraulic cylindrical grinder having a 10-inch swing. This machine will operate with equal efficiency on either traverse or plunge grinding. This machine is equipped with the patented self-adjusting Hydrauto grinding wheel spindle bearings and has a nitralloy spindle and pump lubricated bearings.

The hydraulic table will traverse with smooth reversal at all speeds. For plunge cut grinding the table can be reversed on extremely short strokes down to 1/8 inch, thereby avoiding the



disadvantages of oscillating wheel spindle.

The workhead is driven by a variable speed motor, and in this way a wide range of speeds can be achieved. It is interesting to note that the direct current for the variable speed motor originates from a generator incorporated in the machine design. The motor has been dynamically balanced and this assures smooth running.

All electrical controls have been especially treated so that they are water and oil proof, and all motors are mounted outside the body of the machine so that vibration can be avoided.

This machine can be supplied with full hydraulic auto-sizing wheelhead including diminishing feed to size or with the Churchill Fulcro-Sizer fine feed, making the machine fully automatic in operation. The sizing cycle: quick approach of wheel to grinding position, work starts rotating, diminishing feed during grinding, adjustable dwell at size, signal light during dwell, quick withdrawal of wheel at rest position, work stops for removal.

For further information write to British Industries Corp., International Machinery Div., 164 Duane Street, New York 13, Department BW. **T-12-1252**

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FACTORY-INSPECTED  
DIE SETS**



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you save mounting costs,  
increase production runs**

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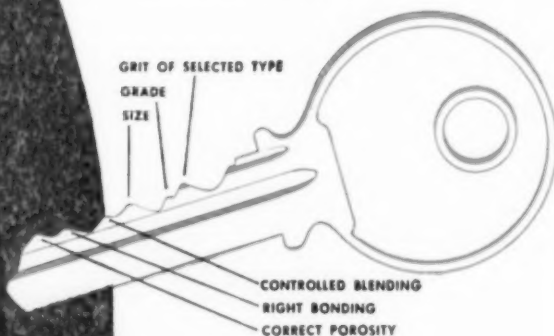
**DETROIT DIE SET CORPORATION**  
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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-125

# WHY **BESLY-TITAN** "Job-Fitted" **WHEELS**

**are the Key to  
Greater Grinding  
Efficiency**



Here's the master key to top efficiency in grinding operations: *Besly-Titan is set up to supply the right wheel for each job, as you need it, when you want it, at no higher cost than stock wheels!*

As the tumblers in a lock yield to just one key, only one set of specifications in the grinding wheel will get *best* results. It is the differences in iron or alloy, quantity of stock removed, type of grinder, results wanted from grinding, etc., that prevent one "key" from fitting job after job. Changed specifications in the work call for changed specifications in the wheel used.

Besly-Titan is organized to diagnose your needs, prescribe the "Job-Fitted" wheels that will perform best on a given job, and supply you on a few-days-delivery schedule. Use the coupon below, or write, to secure all details on formula recommendations and Trial Order Plan.

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**BESLY-WELLES  
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**BESLY-WELLES CORP., 118 Dearborn Ave., BELOIT, WISCONSIN**

(Established as Charles H. Besly & Company in 1875)

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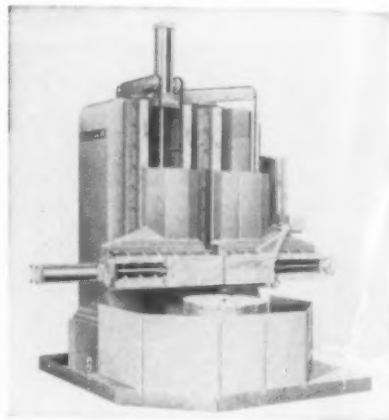
City \_\_\_\_\_

Zone \_\_\_\_\_ State \_\_\_\_\_

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-126

## Contouring Machine

The demand for fast, accurate machining of rather large round parts such as jet engine compressor wheels has created the need for a new type of production machine. The Ex-Cell-O Style 426-A vertical precision contouring machine was designed in response to this need. It performs such operations as precision contouring, boring, turning, facing, grooving and rabbeting. Simple controls and automatic functions make it possible for an unskilled operator to do accurate production work on this machine.



A tracer carried on the horizontal member of the right-hand compound slide controls both vertical and horizontal movements in contouring operations. The tracer finger follows the form on a hardened and ground flat steel template.

Both vertical and horizontal members of the contouring slide are operated through ground lead screws driven by individual variable speed motors. Through the electronic control the adjusted feed per revolution remains constant throughout the cut regardless of variations in the contour or table speed.

The left-hand compound slide consists of a vertical slide supporting a horizontal tool slide, both of which are operated by large hydraulic cylinders for smooth performance. The vertical slide provides feeds for turning, boring and rabbeting, while such operations as facing and grooving are done during the feed stroke of the horizontal slide.

The normal machine cycle includes operation of both compound slides in sequence, either operating first. All slideways are hardened and ground steel and are lubricated automatically to insure continued accuracy.

A large table supported on a vertical work spindle simplifies loading and unloading. The spindle is mounted in tapered roller bearings and is driven through a precision worm. Made by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32.

**T-12-1261**

## Who's Meeting - and Where

**Nov. 28-30. GRINDING WHEEL INSTITUTE.** Annual meeting, Hotel Statler, Buffalo. Contact association headquarters, P. O. Box 64, Greendale, Mass., for more complete information.

**Nov. 30-Dec. 5. AMERICAN SOCIETY OF MECHANICAL ENGINEERS.** Annual meeting, Statler and McAlpin Hotels, New York. For pertinent facts write to the Secretary, C. E. Davies, 29 W. 39th St., New York 18.

**Dec. 1-16. POWER AND MECHANICAL ENGINEERING.** Twentieth national exposition, Grand Central Palace, New York.

**Dec. 2. SOCIETY OF AUTOMOTIVE ENGINEERS, INC.** Hotel Statler, New York. Contact society headquarters, 29 W. 39th St., New York, for details.

**Dec. 2. SPRING MANUFACTURERS ASSN.** Annual meeting, Biltmore Hotel, New York. Association headquarters at 249 Main St., Bristol, Conn. can furnish details.

**Dec. 3-5. SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS.** Fall meeting and exhibition, Hotel McAlpin, New York. Information on meeting from Prof. George Herrmann, c/o Civil Engineering, Columbia University, New York 27. Details on exhibition from Greer Ellis, P. O. Box 77, Pelham 65, N. Y.

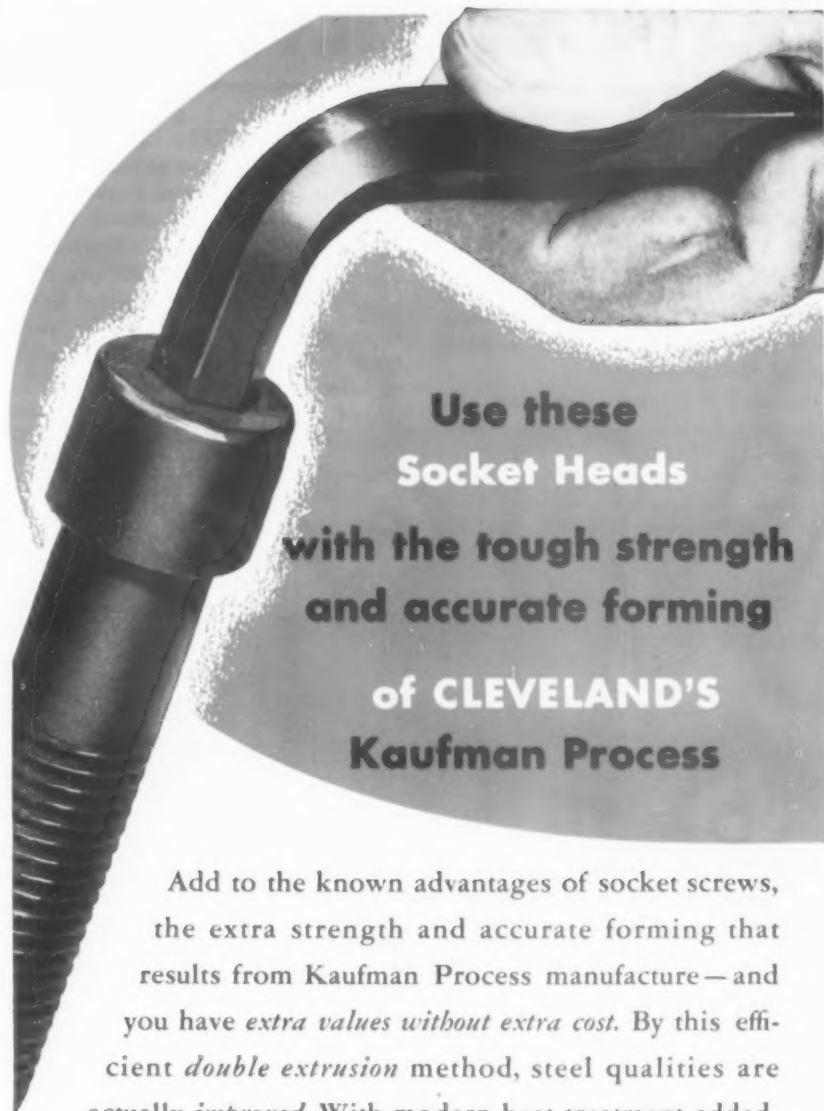
**Dec. 3-5. AMERICAN MANAGEMENT ASSOCIATION.** Conference to be held at Hotel Statler, Cleveland. Write society headquarters, 330 W. 42nd St., New York, for more details.

**Dec. 4-6. AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS.** Electric furnace steel conference, William Penn Hotel, Pittsburgh. More details may be had from society headquarters, 29 W. 39th St., New York 18.

**Jan. 12-16. SOCIETY OF AUTOMOTIVE ENGINEERS.** Annual meeting and engineering display, Sheraton-Cadillac Hotel, Detroit. Contact headquarters, 29 W. 39th St., New York 18 for complete information.

**Jan. 19-22. PLANT MAINTENANCE CONFERENCE.** Fourth annual conference, Public Auditorium, Cleveland. For additional information write the exposition management, Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

**Jan. 26-30. DR. JOHN GAILLARD,** mechanical engineer on staff of ASA, will conduct his next five-day seminar on industrial standardization, Columbia University, Engineering Societies Bldg., 29 W. 39th St., New York. For further details and registration, write Dr. Gaillard, 400 W. 118 St., New York 27.



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Socket Heads  
with the tough strength  
and accurate forming  
of CLEVELAND'S  
Kaufman Process**

Add to the known advantages of socket screws, the extra strength and accurate forming that results from Kaufman Process manufacture—and you have *extra values without extra cost*. By this efficient *double extrusion* method, steel qualities are actually *improved*. With modern heat treatment added, Cleveland Socket Screws are *extra tough*. And the true hex sockets, formed in one operation, are clean all the way to the bottom with sharp corners that give firm purchase to the key. It pays you to specify and buy Cleveland Socket Head Screws.



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# TRADE LITERATURE

Free Booklets and Catalogs  
Currently Offered By Manufacturers

## Machining

Complete, illustrated catalog 5205 covers full line of lathes, drill presses, bench shapers and accessories emphasizing quality, efficiency, economy and other advantages; descriptions include specification and construction data. **South Bend Lathe Works**, South Bend 22, Ind. L-12-1

## Speed Reducers

Pamphlet "Clevelands—at Work" illustrates company's worm gear speed reducers in operation at different companies under various conditions and stressing money-saving results. **The Cleveland Worm & Gear Co.**, 3293 E. 80th St., Cleveland 4. L-12-2

## Powder Metallurgy

Illustrated 32-page manual, "Facts About Pressed Brass and Other Non-ferrous Powder Parts", offered as concise reference to factors affecting designing and selecting small structural parts for fabrication by powder metallurgy method. Emphasis is on parts made from brass, but examples of nickel, silver and bronze applications included. Second section of book contains extensive case history type data illustrating aspects of topics in first section. Request on company letterhead. **The New Jersey Zinc Co.**, Front and Fletcher Sts., New York 38, N. Y. L-12-3

## Electrodes, Welding

Pocket-size booklet GED-1634 describes application, chemical analysis and mechanical properties of G-E welding electrodes; trouble-shooting chart lists problems with their causes and remedies; charts for stainless steel electrodes give AISI code numbers with corresponding brand names, required power supply and G-E electrodes and AWS number, as well as an explanation of the significance of the AWS nomenclature. **General Electric Co.**, Welding Dept., Fitchburg, Mass. L-12-4

## Precision Switches

Catalog 82 shows Micro precision switches designed primarily for control of a-c circuits in commercial and industrial applications. Extensively illustrated, each model (die cast enclosed, explosion proof, splash-proof, general purpose limit and basic etc.) is presented with photos and engineering drawings as well as descriptive data. **Micro Switch**, div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill. L-12-5

## Roller Bearings

Catalog No. 522 contains description and specifications of bearing selection for materials handling, automotive, and other industries; covers rollers, bearings, roller assemblies, cage and split outer race assemblies together with bearing selection data covering load speed factor, stationary shaft factor and bearing life with shaft and housing limits. **Berliss Bearing Co.**, 14-18 Carmer Ave., Belleville 9, N. J. L-12-6

## Chucking Tools

Catalog bulletin 17-50 deals with "Roll-Lock" chucking tools which use a holding method which takes advantage of the elastic properties in metal; not only explains operation, uses and advantages of various tools, but engineering drawings and tables give statistical data. **Scully-Jones and Co.**, 1915 So. Rockwell St., Chicago 8. L-12-7

## Flexible Metal Hose

Catalog CC-400 illustrates and describes line of both seamless and strip wound flexible metal hose and tubing, showing wide range of available alloys and sizes, suggested applications, and furnishing data on hose and fittings; also includes pertinent engineering information. **The American Brass Co.**, American Metal Hose Branch, Waterbury 20, Conn. L-12-8

INDUSTRY'S  
LEADERS —  
SAY

**Sentry**

IN  
HEAT TREATING  
HIGH SPEED  
STEEL



Sentry Model 3Y at Wetmore Reamer Company, Milwaukee, Wisconsin

## WETMORE REAMER SAYS:

"More Life—More Production—Easier Operation"

So says James E. Colburn, Supt. of Heat Treat at Wetmore. He goes on: "Our Sentry 3Y runs at 2175° to 2360° 6 to 8 hours a day, five days a week. Our Sentry Diamond Blocks enjoy a long and useful life under these conditions. The rate of production and ease of operation are very pleasing."



Request  
Catalog  
WE-2



SENTRY MODEL YP  
Vertical model  
for long, slender  
drills, reamers,  
broaches, etc.



SENTRY MODEL 2Y  
For small tools,  
cutters of moly,  
tungsten and cobalt  
high speed  
steels.

**THE SENTRY COMPANY**

FOXBORO, MASSACHUSETTS

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS  
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-128



### Tygon Linings

Full illustrated 12-page bulletin TL-526 on "Tygon Corrosion-Resistant Linings" presents history of Tygon as a lining and covering material, discusses its composition, physical forms and physical properties and where and how to apply it, and compares it with other type lining materials. Tables offer information on chemical resistance. **The U.S. Stoneware Co.**, 60 E. 42nd St., New York. **L-12-9**

### Surface Roughness

Four-page illustrated folder, Form L-21, "How to Specify Surface Roughness—and Why" explains the term as applied to machined and finished surfaces and describes practical advantages of surface roughness specifications. Also tells how to establish these specifications for parts both in production and of new design, as well as giving other data pertinent to the subject. **Micrometrical Manufacturing Co.**, 345 S. Main St., Ann Arbor, Mich. **L-12-10**

### Bushings

Simple, easy-to-follow catalog No. 10 offers Acme standard bushings; laid out with an eye to saving time and effort in selection of proper bushing for specific case, features both ASA and Acme Standards for each type of bushing as well as offering listings for liners, lead pins, dowel pins, locating jigs, lock screws and clamps. **Acme Industrial Co.**, 200 N. Laflin St., Chicago 7. **L-12-11**

### Magnetic Alloys

Eight-page technical data booklet TD-52-100 on magnetic alloys deals with "what is it" and "where to use it" for such materials as Hipernik, Hipernik V and Conpernik, all iron-nickel alloys, and Hiperco, an iron-cobalt alloy; includes physical and magnetic property tables together with the availability of each alloy in addition to discussions of individual alloy heat treatment techniques and other data. **Westinghouse Electric Corp.**, Box 2099, Pittsburgh 30. **L-12-12**

### Air Cylinders

Bulletin A-105G presents complete engineering, design, construction and mounting data including all mounting drawings and dimension tables covering 13 different mounting styles; assembled with an eye to saving time for engineers and designers using the material. Cut-away view of cylinder includes references to exact specifications of JIC pneumatic standards met by various design and construction features. **Miller Motor Co.**, 2040 N. Hawthorne Ave., Melrose Park, Ill. **L-12-13**

### Metalworking

Thirty-two page catalog describes how company's line of both hand and power-operated machines performs variety of forming, cutting and punching operations in medium and light weight material, materials; machine specifications and material forming capacities for equipment tabulated for simple reference. Features photographic case histories of how companies are applying "Die-less Duplicating" techniques to particular problems. **O'Neil - Irwin Mfg. Co.**, 625 Eight Ave., Lake City, Minn. **L-12-14**

### Processing, Heat Treating

General catalog No. 52 features line of heat-treating equipment. In addition to illustrating containers, fixtures and retorts commonly used in carburizing, annealing, etc., it also contains variety of installation views of new equipment offering possibilities for saving handling and heating time. Also includes descriptions of types of tubing made by the company for annealing, firing radiant furnaces, venting noxious gases and protecting thermocouples. **The Pressed Steel Co.**, Wilkes-Barre, Pa. **L-12-15**



**JIG and FIXTURE COMPONENT PARTS**

Eliminate the designing and making of clamps and other fixture parts. **LODDING** makes them for you.

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CLAMP ASSEMBLIES  
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Write for  
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showing 365 items  
that can save you  
time and money.

**LODDING, Inc.**  
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# Here's Why the New TOP-CLAMP KENNAMATICS Give Top Performance

**EASY TO GET AT—**  
double end socket type  
screw permits release  
of clamp from either  
top or bottom.

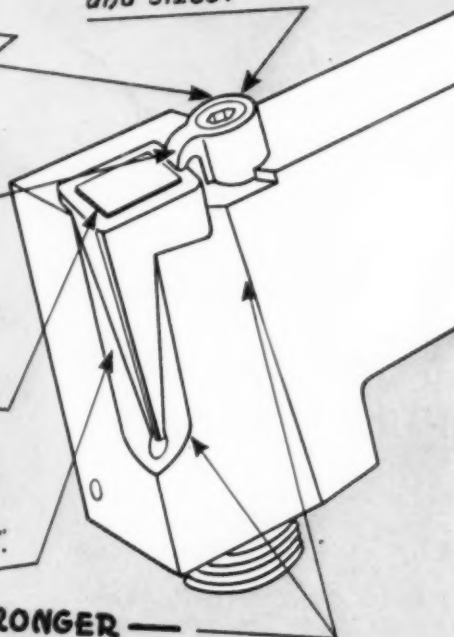
**SIMPLIFIED DESIGN—**  
one rugged clamp and  
one sturdy screw for  
all standard tool styles  
and sizes.

**EASIER TO INDEX—**  
simply loosen clamping  
screw and clamp is up  
and away from insert.

**CHIP BREAKER —**  
most types can be used  
on insert without in-  
terference with clamp.

**OPEN FRONT —**  
provides added clearance  
and eliminates shank  
abrasion from "chip wash".

**STRONGER —**  
design provides greater rigidity.  
Insert is solidly backed up in  
direction of cutting force.

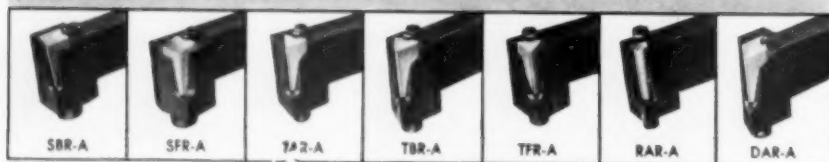


## ALL Proved KENNAMATIC Features Retained!

- Indexable insert—positioned vertically—makes best use of Kennametal's high compressive strength.
- Simplified tool setting—insert has several cutting edges on both ends; can be revolved, turned end over end, or replaced without changing tool setting.
- Less grinding expense—resharpening merely requires squaring off ends of insert, and grinding chip breaker if desired.
- Available in all "industry standards" for wide range of jobs on various metals. Heavy duty styles also available.



**KENNAMETAL Inc., LATROBE, PA., U. S. A.**



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-130

## Technical Shorts . .

**D**EVELOPMENT of a rapid, convenient method for purifying zirconium has been reported by the National Bureau of Standards. Concentrated sulphuric acid is poured into a fairly concentrated aqueous solution of zirconium sulfate or chloride. Resulting precipitate is dissolved in water. The process, repeated several times, leads to zirconium sulfate of high purity. Previously, purification has been quite difficult, and as a result, according to the Bureau, laboratories have used zirconium in whatever purity they could purchase it.

\*\*\*

**N**ORTON CO. has announced a recent development in the field of oxide coatings. It consists of adherent high refractory crystalline protective coatings of oxides such as aluminum oxide or stabilized zirconia formed on the surface of graphite or metals such as steels and aluminum. Purpose of the coating is to protect base material and to insulate thermally the base material for short periods of time.

\*\*\*

**P**LYMETAL SHIMS for brazing carbide tool tips are replacing the "sandwich" brazing technique in the operations of a large number of metal manufacturers according to Ross Bayes, executive vice-president of The American Platinum Works, refiners of precious metals. Mr. Bayes, whose company pioneered the development and introduction of the laminated sheet to industry, attributed the position plymetal is achieving in the field to two chief advantages—economy and efficiency. In this connection, increases up to double production volume have been reported by some firms. Considering the process in the light of labor saving, the principal factor involved is the use of one plymetal shim instead of the three formerly required to braze carbide-cutting tool tips. Skilled workmanship is minimized by the fact heat is applied to the units following simply fluxing and positioning. In addition, Mr. Bayes points out, need for sandblasting and rubber wheel clean-up is almost eliminated.

At the same time, the elimination of excessive thermal and other stress in the brazed joint claimed for this method makes it advantageous for applications where brazed areas must be free of such stresses.

**The Tool Engineer**

**K**ENTAMETAL INC. has introduced a heat-resistant titanium carbide which means practical improvement in jet-powered aircraft performance. Today's jet aircraft engines operate at 1500 deg F. The turbine blades of the new material, known as Kentanium, have been operated at 1800 deg F. Making possible this boost in operating temperatures produces a consequent increase in power output that can be figured geometrically.

According to the producers, Kentanium's high strength, oxidation resistance and light weight are encouraging jet engine designers to foresee a tremendous stride toward the performance they have long been aiming for.

\* \* \*

**A** MAGNETIC material exhibiting coercive force of 3,000 oersteds is a development reported by Naval Ordnance Laboratory, White Oak, Md. This is greater than any known magnetic material. Made by the powder metallurgy technique, production involves heating powdered manganese and bismuth at 700 deg C and hot pressing the resulting bismuthide at 300 deg C in a strong magnetic field.

Detailed information concerning the development is available from Navy Technical News, Office of Information, Navy Department, Washington 25, D.C.

\* \* \*

**T**HE AMERICAN STANDARDS Association has approved a Safety Code for Forging and Hot Metal Stamping, which embodies provisions for safety in the use of power-forging machinery for both drop forging and flat-die forging.

Designated B24.1-1952, the code applies to all classes of power-forging machinery and incidental operations and equipment in connection with such machinery. Specific points include requirements for working and aisle space, construction of platforms, lighting, head and foot protection and safety clothing and safety devices, as well as requirements for all equipment tools. Provisions also are given regarding furnaces—the hood, insulation of sides and pressure release devices.

A revision of a 1927 edition, the code is consistent with up-to-date forging practices and operations. Copies are available from ASA, 70 E. 45th St., New York 17, for \$1 per copy.

\* \* \*

**A**N UNUSUAL PROCESS for corrosion treatment of mild steel and other ferrous metals has been announced as ready for industrial production. Possibly the most outstanding advantage obtained through its use at the moment

is the expected substantial reduction in the loss of critical metallic materials by corrosion during the time between manufacture and use.

The development, known as the Permyron process, discovered by Oscar B. Bach, an industrial engineer, has been in the experimental stage for more than 13 years. It consists of thermo-chemical treatment. Application requires a chemically clean surface which, under controlled conditions, is treated hot—though not hot enough to temper and soften cold-rolled or other work-hardened steel. The material is absorbed into the pores of the metal during treatment, hence the coating does not change dimensions enough to be measured by a micrometer—an important point in

processes requiring close fits. Tests show that metal subjected to the treatment forms a dense undercoating or primer for either baked or air-dry paint, and forms an inert, flexible base resistant to ordinary weathering or acid conditions. In addition to the bond formed between the metal and the finish coat, its flexibility is supposedly sufficient to maintain that bonding power and corrosion protection after considerable deformation.

Tests on the material have been carried on by several interested groups including Vega Aircraft Corp. and the Chemical Warfare Service of the U.S. Army.

Stanwood Oil Corp. has acquired exclusive licensing rights to the process.



## BAND SAW BLADES

### THE SHAPE OF THINGS TO CUT

with BARNES HARD EDGE FLEXIBLE BACK BAND SAW—

*Dependable All Ways*

#### 3 FAMOUS BLADES

**CONVENTIONAL RAKER AND WAVY SET** ... for all general purpose cutting, on all contours and cut-off band saw machines.

**SKIP TOOTH** ... Designed for high speed cutting of soft, non-ferrous metals, plastics, wood, rubber, laminated and fibrous materials.

**3 PACKAGES** ... for Your Convenience and Economy

- ① Handy ARC-LINE package—100 FT. COILS  
Coiled loosely to unwind easily Arc-Line is compact for storing—convenient for handling.
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# North East West South IN INDUSTRY

The appointments of **Howard J. Evans** as chief engineer and of **Robert J. Sarraf** as chief chemical engineer, has been announced from the **Rockwell Manufacturing Co.**, Meter and Valve Div. Mr. Evans, who has been with the organization since 1935, also will continue as chief engineer for gas products. Mr. Sarraf joined Rockwell five years ago following several years' experience with the Mellon Institute of Industrial Research. Until his present appointment, he was chemical engineer at the company's Pittsburgh Headquarters.

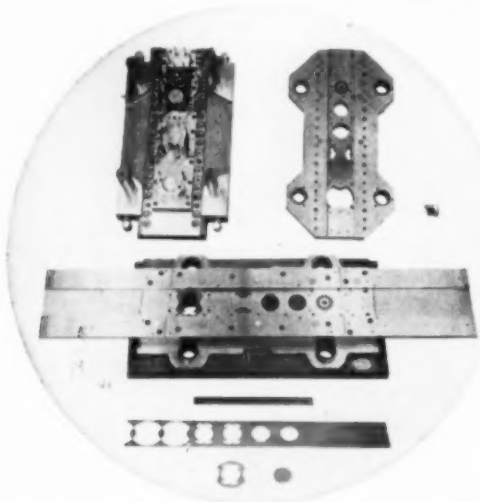
A number of executive changes have been announced by **The L. S. Starrett Co.** **Wallace Findlay**, previously assistant treasurer, has been named treasurer and director. **Clifton G. Bigwood**, vice-president in charge of plant operations, has also been appointed a director. **Douglas R. Starrett**, chief methods engineer, also was elected a director. **Edward L. Schmidt**, secretary and clerk of the corporation, has been appointed assistant treasurer.

Mr. Bigwood is a member of ASTE's North Central Mass. group.

**William J. Pinkerton** has been named vice-president in charge of manufacturing at **Micromatic Hone Corp.** Mr. Pinkerton formerly was director of public and industrial relations for the firm.

Other appointments announced at the same time by Micromatic were the promotion of **Arthur B. Kowalski** to the position of factory manager, and the naming of **Joseph Bolz** and **Glenn Rosene** to the posts of division superintendents. **Odiel Verhelst** is superintendent of afternoon operations.

## This die was not just "made"... it was **ENGINEERED**



Just a choice of words, you say? No, it's more than that. The progressive steel lamination die shown here was hole-bored, hole-ground and contour-ground to pre-engineered dimensions entirely on Moore-built machines in the Moore toolroom. It exemplifies the application of engineering principles that put die-making on an interchangeable parts-and-assembly basis for the first time.

Let's take a close look at this die: All die sections are mounted in a hardened nickel-chrome frame for maximum production and die life; the die set was specially made by Moore. The spring stripper is guided on four main posts. High-speed inserts are set into hardened steel frames.

Moore produced all parts of the die to figures instead of to ".001". This was done concurrently by several toolmakers instead of progressively as a slow, one-man job.

### Precision Hole Location and Contour Grinding Methods Assure Accuracy, Speed, Economy

THE NO. 2 MOORE JIG BORER bored all holes before hardening, thus holding the location as close as possible to eliminate excessive grinding. With its built-in system of accurate lead screws, the Moore Jig Borer can spot, drill, bore or ream all holes in a workpiece with minimum tool changes and to close tolerances.

Punches and dies of the first station—at the right in the photograph—were ground with a **Moore Panto-Crush Wheel Dresser**. This machine, which combines roll-crushing and diamond dressing, did the required linear contour grinding quickly and effi-



NO. 2 MOORE JIG BORER

ciently. **Moore Motorized Centers** handled several of the smaller grinding jobs.

WITH THE NO. 2 MOORE JIG GRINDER, all die sections were screwed and doweled into place, put on the machine and ground in one set-up. This eliminated separate section hole-grinding and the accompanying difficulty of accurately locating each section in the die bed. The Jig Grinder does the job in one-third the time required by previous methods.

To grind Stations 2, 3, 4, 5 and 6, the new contour-grinding and slot-grinding features of the Jig Grinder were utilized.

Die try-out and assembly operations were performed the modern, fast, "mechanized" way on the **Moore Die Flipper**.

End results? Moore equipment brings true interchangeability to the toolroom, lowers tool costs, increases toolroom capacity, prolongs die life and achieves greater accuracy.

Detailed bulletins on these machines are yours for the asking—today. Write to: **Moore Special Tool Company, Inc.**, 732 Union Avenue, Bridgeport 7, Conn.

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NO. 2 MOORE JIG GRINDER



W. J. Pinkerton



R. W. Banfield

**Richard W. Banfield** has been elected a vice-president of **Niles-Bement-Pond Co.** by the firm's board of directors. Formerly treasurer of the company, Mr. Banfield will continue to carry on his duties for that office. The board also elected **David R. Anderson** to the position of controller. He will assume authority and responsibility for the portion of duties previously handled by Mr. Banfield which normally fall within the province of corporation controller.

The election of two new directors and a secretary has been announced by **Gerity-Michigan Corp.** The directors are **Robert T. Dunlap**, president of Great American Industries, Inc., and **Hal A. Kroeger**, a founder of A. & H. Kroeger Organization. **J. Cary Thompson, Jr.**, a director and formerly assistant secretary, was named secretary to succeed **J. F. Langs**, who will continue as the corporation's general counsel and a director.

Appointment of **Joseph S. Imirie** to the recently created position of assistant to the president has been announced from **The Carborundum Co.** In this position, Mr. Imirie will give staff assistance to the president and executive vice-president in the general management of the business of the company as well as assisting with development of company objectives, policies, organization structure and programs.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-132



Two announcements recently were made by **Aro Equipment Corp.** Following the board of directors' meeting, **A. N. Abelson**, formerly general manager of Aro's Cleveland plant, was named vice-president in charge of manufacturing. He now is responsible for all production at both the Cleveland and Bryan, Ohio, plants.

Also from Aro was the announcement of **John R. Markey** being named to the position of assistant to the vice-president. Prior to this promotion, Mr. Markey was aircraft sales manager.

**Charles W. Smith** has been appointed general manager of the **Rodney Manufacturing Corp.** Mr. Smith, who has long been associated with metallurgy, both as research engineer and development manager, will head the recently inaugurated expansion program and also take charge of the development of new techniques for metal processing.

The appointment of **A. O. Williams** as director of engineering, Industrial Truck Div., has been announced by the **Clark Equipment Co.** Mr. Williams' responsibilities will include coordinating and leading all engineering activities in the field of material handling equipment. Well versed in the field, he holds ninety patents for mechanisms in the railroad and industrial truck fields.

## OBITUARIES

**Joseph Minarik**, president of the **Abart Gear & Machine Co.** died recently at the age of 59. Mr. Minarik had been a prominent figure in gear manufacturing and similar industrial circles for a number of years.

**Fred H. Haggerson**, chairman of the board of **Union Carbide and Carbon Corp.**, died recently after a short illness. He was 68 years old. Mr. Haggerson, who had been with Union Carbide for more than 33 years, achieved a vice-presidency in 1938, and became a director in 1941. Three years later he was made president and a member of the executive committee, and last year was named chairman of the board. His liberal policy of research and expansion is given considerable credit for the growth of the corporation.

**Harry D. Siegfried** died suddenly of a heart attack at the age of 63. Mr. Siegfried who had been active in the steel industry the greater part of his life, had been associated with **Henry Disston & Sons, Inc.**, since 1924. He had retired last April 1. At that time he was manager of sales, Steel Div.

# This new **DUMORE** grinder eliminates hand sharpening of small drills



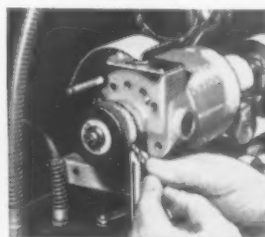
HERE'S a remarkable new grinder that sharpens small twist drills with amazing speed and precision. Enables you to do away with expensive machine shop maintenance of 2-lip drills—No. 70 to 1/4".

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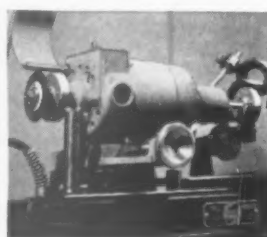
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**BROKEN DRILL RECLAIMER** — Drills can be rough ground and reshaped on roughing wheel . . . then sharpened. (Grooved drill rest also serves as holder and locating fixture for diamond wheel dresser.)



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## Good Reading

### A GUIDE TO SIGNIFICANT BOOKS AND PAMPHLETS OF INTEREST TO TOOL ENGINEERS

**FATIGUE AND FRACTURE OF METALS**, edited by William M. Murray. Published jointly by the Technology Press of the Massachusetts Institute of Technology and John Wiley and Sons, Inc., New York. 313 pp; price \$6.00.

The fourteen papers which make up this book were presented at a symposium on the fatigue and fracture of metals held at the Massachusetts Institute of Technology in 1950.

The discussion embraced general experience with failure of metals, specific fields in which it occurs, the internal mechanisms probably involved in fatigue damage, the significance of various metallurgical phenomena to fatigue, the potential usefulness of different research methods to disclose more about the mechanism itself and about the ways of countering it in design, and the direction of future research as forecast by the participants' recommendations.

The papers attempt to focus the knowledge now available on this important phenomenon. The fundamental nature of damage due to repeated loading is complex and relatively unknown; lack of definite information about it makes impossible the prediction of the safe service life of designs without the expensive and often impracticable full-scale testing to destruction.

**FUNDAMENTALS OF PHYSICAL METALLURGY**, by Ralph Hultgren. Published by Prentice-Hall Inc., 395 pp; price \$9.35.

Based on the proposition that physical metallurgy has now progressed from an art to a science, the author says that principles are universal and apply to all alloys, that they constitute the science as opposed to the art. This volume presents these scientific principles and shows how they are applied. The treatment is quantitative wherever possible, with numerous problems given to illustrate principles. Theory is integrated with application, and each theory is clarified by a practical example. A few of the sections and some of the problems require a background in chemistry and physics.

A short description of the principles behind laboratory procedures is included in the latter section of the book. The reasons for each are emphasized rather than the technique.

**The Tool Engineer**

**INVESTMENT CASTINGS FOR ENGINEERS**, by Rawson L. Wood and David von Ludwig. Published by Reinhold Publishing Corp., 330 West 42nd St., N.Y. 36. 477 pp; price, \$10.

Arranged for day-to-day reference use, this book offers a comprehensive description of the salient features, advantages and limitations of investment castings as they are employed in the metalworking industries.

Emphasis is on design engineering factors which determine the attainable precision of cast dimension, cleanliness and uniformity of metallurgical structure. The book points out both present accomplishments and the considerations involved in developing further the industrial phase of investment castings. Present design and metallurgical limits are clearly defined, as are the degrees of cast tolerance control now commercially obtainable.

Recent techniques are described in detail. Two chapters deal with the frozen mercury method, giving a full picture of the mechanics of the process. The metallurgical data included have been mostly derived from actual tests of investment cast specimens. The various interrelationships between wax, plastic and mercury processes are outlined in detail.

**ECONOMIES OF AMERICAN MANUFACTURING**, by Edward L. Allen. Published by Henry Holt and Co., 383 Madison Ave., N.Y. 17. 566 pp; price, \$6.95.

This volume, which contains 208 photographs and 68 diagrams, is a cross-sectional view of American industry. Nineteen representative industries are examined within five general categories: basic metal, basic nonmetallic, metalworking, textile and allied, and consumer specialty. Included within these groups are automobiles, machine tools, aircraft, agricultural implements, leather goods, cotton textiles, synthetic fibers, food, beverages, tobacco, furniture, and other components of American technology.

Following an introductory chapter on the place of manufacturing in the American economy, the author analyzes each industry from three viewpoints: its setting in the national economy—relative size and importance, use pattern of the product, export-import relationships, and relations with the federal government; structure of the industry—corporate ownership and control, location and capacity of plants, technology of manufacture, and input and cost factors; financial factors—prices and pricing policy, profits and future outlook. A concluding chapter is devoted to sources of industry data and an extensive bibliography.

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*Left: Front view, showing splash guards for wet cutting.*

*Right: A close-up view of typical tooling set-up.*



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## Abstracts of Foreign Literature

By M. Kronenberg

### Machine Tool Development

Since the end of World War II a rapid development has taken place all over Europe in the design of machine tools, partly supported by Marshall Plan money and partly by the efforts of the respective nations.

The machine tool industry in Western Germany now comprises about 400 to 500 companies. The French machine tool industry has grown from about 20 companies before the war to nearly 250 companies with 18,000 employees. Sixty companies are engaged in Switzerland in the development of machine tools, while the Italian machine tool industry has increased on a scale similar to the French machine tool industry. Belgium employs 3000 men skilled in machine tool production.

A survey of the trend in machine tool design in foreign countries was given at the recent machine tool show held at Hanover, Germany, which was visited by many American tool engineers, and which is discussed in a special issue of *Werkstatt & Betrieb* with contributions by C. Stromberger & H. Boeker (Germany), Marvel Chalvet (France), E. Broedner (Switzerland), Ricardo Denon (Italy), Eduard Henrion (Belgium), J. Zeman (Austria), M. Kronenberg (USA), P. Grodzinski (England).

Structural rigidity, vibration-free operation, high surface finish, accurate performance and short production time were particularly stressed in the exhibits. Among the lathes were some designed in such a way that basic units could also be used in different types of machines, thus making it possible to manufacture in greater quantities than is traditional in many machine tool plants. A number of drilling machines were equipped with infinitely variable spindle speeds and feeds and some of them had preselector devices.

Radial drills permitting remote control of the electric-hydraulic clamping mechanism were on exhibit and a jig borer was seen on which the setting and adjustment of the machine can be controlled while observing tool and work on an opaque screen instead of looking through the eyepiece of a telescope which is usually a heavy strain on the eyes of the operator. Other optical equipment, increasingly used on machine tools, is likewise discussed in

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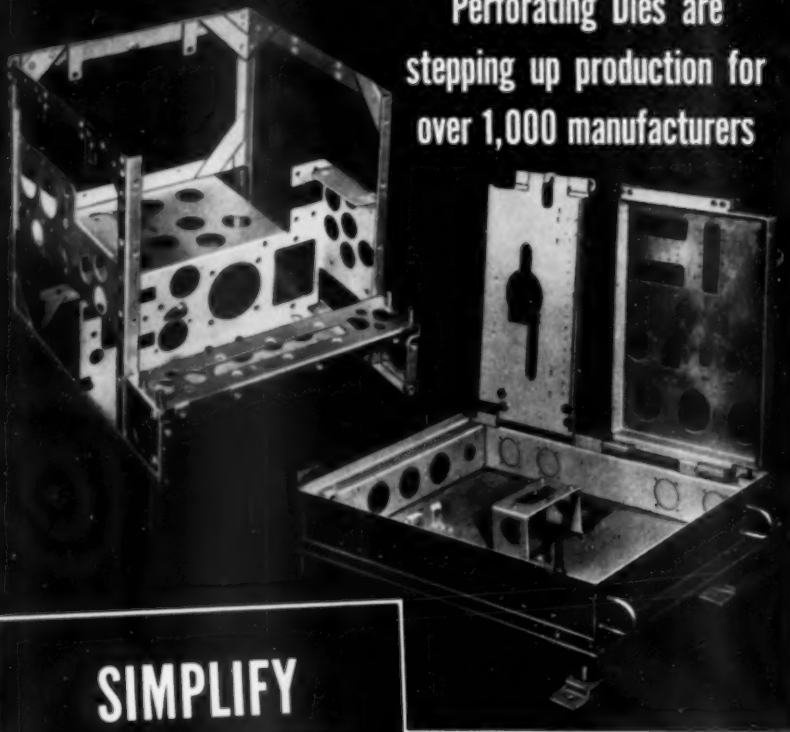
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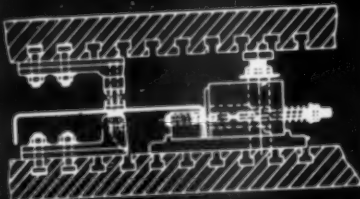
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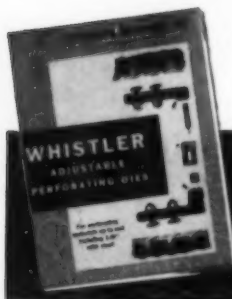
**U**SE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals ... fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press ... without waiting and at no extra cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

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the above-mentioned articles.

Manufacturers of grinding machines claim accuracies that can be obtained on their machines of 0.000 080 to 0.000 120 inch. On a centerless grinding machine the work guides were replaced by rolls in order to reduce friction and to increase accuracy. Centerless grinding of tapered workpieces was demonstrated where the regulating wheel controls its own position automatically according to the taper of the work. In this way it is possible to have the workpiece considerably longer than the width of the wheel. Surface finish with a roughness of as little as 0.000 004 to 0.000 008 inch can be obtained on an oscillating grinder operating at a frequency of 2000 vibrations per minute, as against a frequency of only 500 to 600 per minute previously used.

Thermostatic control of the motors of milling machines is used for preventing overloading of the machines by too heavy feeds or by the dulling of the milling cutter. The motor is stopped when the current exceeds a predetermined and adjustable limit.

The high cost of geared headstocks is claimed to be reduced by employing V-belts throughout the machine, whereby an infinite speed variation is possible in conjunction with the motor design. Pushbutton-controlled milling machines were exhibited and also milling machines claimed to be program-controlled. The term program-controlled as used in Europe refers usually to the automatic setting of speeds and feeds by means of perforated cards, while we use this term in conjunction with contour milling or turning by perforated tape, replacing templates.

### Methods Time Measurement

Paul F. Fonallaz reports in *Industrielle Organization* No. 9, 1952, on methods time measurements carried out in Switzerland with the aid of moving pictures. These tests, instigated by American methods, were made because, in the author's opinion, improvements could be made to better adapt the method to practical conditions in production plants. The principal difference between the American and the Swiss methods lies in the instructions given the operator who is being tested while the movies are taken. He is only told to work first at his regular speed and then to slow down. He has the choice to change the tempo as he desires. The article is well illustrated, winding up with conclusions and comments on the relative merits of the two methods.

### Surface Finish

A new method was developed for measuring surface finish of turned workpieces by weighing the chips removed in the turning operation. This

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is described in an article by W. Leyen-  
setzer in *Zeitschrift des Vereins Deut-  
scher Ingenieure* No. 52, 1952.

In his tests, the author used work-  
pieces in which two longitudinal grooves  
had been milled, set at an angle of  
72 deg in order to obtain long and short  
chips per revolution. Circumferential  
grooves were likewise cut as a means  
for separating the regions on the work  
where different cutting speeds were  
tested in their effect on surface finish  
and chip weight.

The longitudinal grooves were cov-  
ered by inserted sheet metal pieces in  
order to eliminate the effect of impact  
on the tool. Depth of cut was standard-  
ized (0.080 in.) and so was the feed  
rate (0.014 in.) while the cutting speed  
was varied between 190 and 1900 fpm.  
Each speed was tested ten times.

The tests were run on five different  
steels and the average weight from the  
ten tests per steel sample, accurately  
determined on a scale which permitted  
reading to 0.000 004 ounce.

It was found that a decrease in rough-  
ness was always associated with a de-  
crease in chip weight; that is, the bet-  
ter the surface finish, the less the chip  
weight. This phenomenon seems to be  
due to the fact that the chip is less  
compressed at higher speeds and that  
the better surface at higher speeds is  
the result of less penetration of the  
crack in the workpiece preceding the  
cutting tool (Note: The existence of  
such a crack is denied by some metal-  
cutting research men).

The author claims that the new  
method which needs further develop-  
ment is more accurate than measuring  
surface finish with the stylus of a sur-  
face analyzer because the stylus cannot  
penetrate into the many small valleys  
of the work surface. It is also claimed  
that the method is faster than the tra-  
ditional methods.

The same author published another  
paper in *Stahl & Eisen* No. 19, 1952,  
dealing with the chip deformation and  
the distortion of the work surface due  
to turning operations. He found that  
the compression of the chip (often  
called chip ratio in the U. S.) is not  
only affected by the tool configuration  
and speed but also by the tool material.  
Carbides and HSS tools cause different  
surface distortions. A heavy surface  
distortion is associated with a heavy  
compression of the chip, but is not  
affected by the tool angles any more  
when the cutting speed exceeds 1000  
fpm. Only the tool material then plays  
an important role in the distortion of  
the work surface. The latter affects the  
fatigue resistance of the workpiece and  
hence failures under vibratory condi-  
tions to which the workpiece may be  
subjected when assembled in a ma-  
chine.

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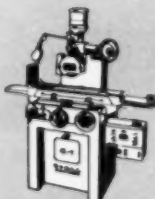
SB-12



Sample page above from DoALL Band Tool Manual. Contains 160 pages of helpful information on the use and selection of saw bands and other band tools. Price—\$2.00—available through your local DoALL Sales-Service Store.



BAND MACHINES



SURFACE GRINDERS



GAGE BLOCKS



GAGING EQUIPMENT



MOBILE INSPECTION



# POTTER & JOHNSTON TOOLING

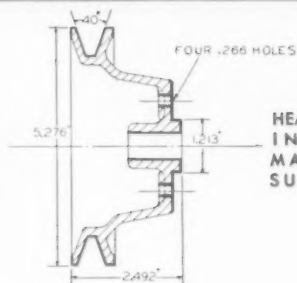
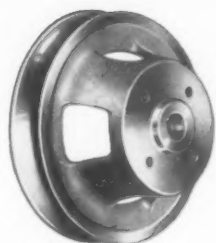
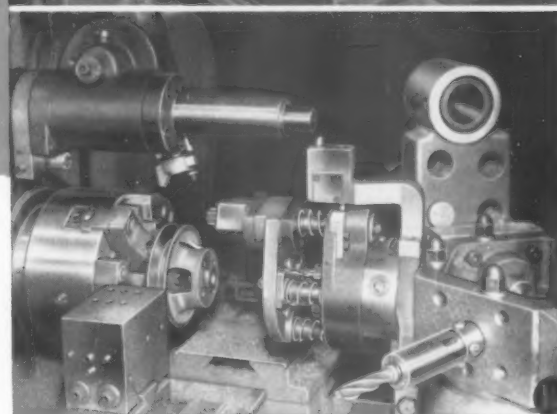
makes possible

**4 OPERATIONS**  
with **ONE SETTING**  
in **3.26 Minutes . . .** on a



**3U**  
**SPEED-FLEX**

**Automatic Turret Lathe**



HEAVY LINES  
INDICATE  
MACHINED  
SURFACES.

Difficult chucking jobs — like finishing the cast iron pulley shown above — are done easily, rapidly and economically with expertly engineered Potter & Johnston Tooling on a P&J 3U Speed-Flex. Full power and high spindle speeds allow fast metal removal with carbide cutting tools. The pulley groove is finish machined by two single-point slide tools — thus eliminating any distortion that might result from a broad face cut. As the last step, the four .266" holes are accurately located and drilled by a special, 4-spindle drill head that is automatically positioned and locked at the completion of the preceding operation. With this ingenious, time-saving set-up, all operations are performed automatically; one operator can easily handle several machines, and your labor costs are divided.

If your manufacturing operation requires the rapid production of small, precision parts, it will pay you to learn more about Potter & Johnston Tooling and the P&J 3U Speed-Flex Automatic Turret Lathe. See how this combination can help you increase output, improve work quality and reduce unit costs.

Send in sample parts or prints for tooling recommendations and time estimates — and send today for your copy of fully illustrated P&J Bulletin 145.

**POTTER & JOHNSTON**  
**COMPANY**  
PAWTUCKET, RHODE ISLAND



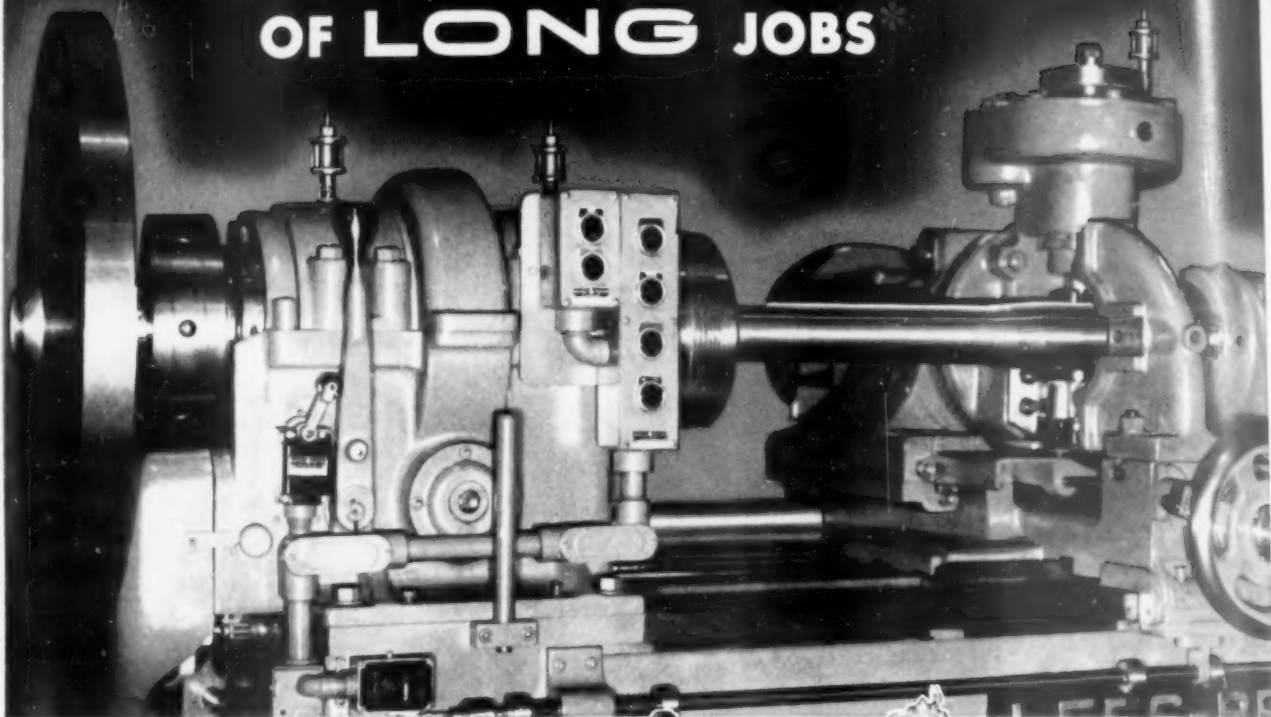
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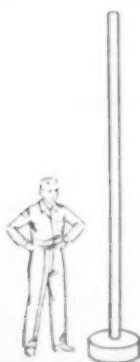
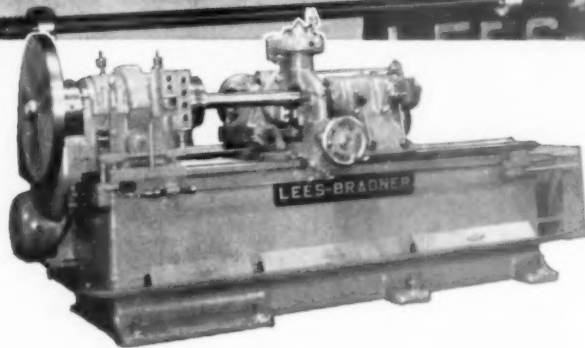
DIVISION NILES — BEMENT — POND CO.

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*End Loading*  
SH SPLINE HOBBER



The SH hobs splines  
up to 144".

The exclusive Lees-Bradner "feed through spindle" feature enables the SH spline hobber to handle long and bulky parts with maximum efficiency and speed. It also provides the necessary support for long splines of small diameter.

The SH will hob splines up to six inches in diameter and can handle spur and helical gears up to eight inches.

Let Lees-Bradner, the first name in hobbing, be your first thought when you have a hobbing problem. Your Lees-Bradner representative will be happy to consult with you without obligation.

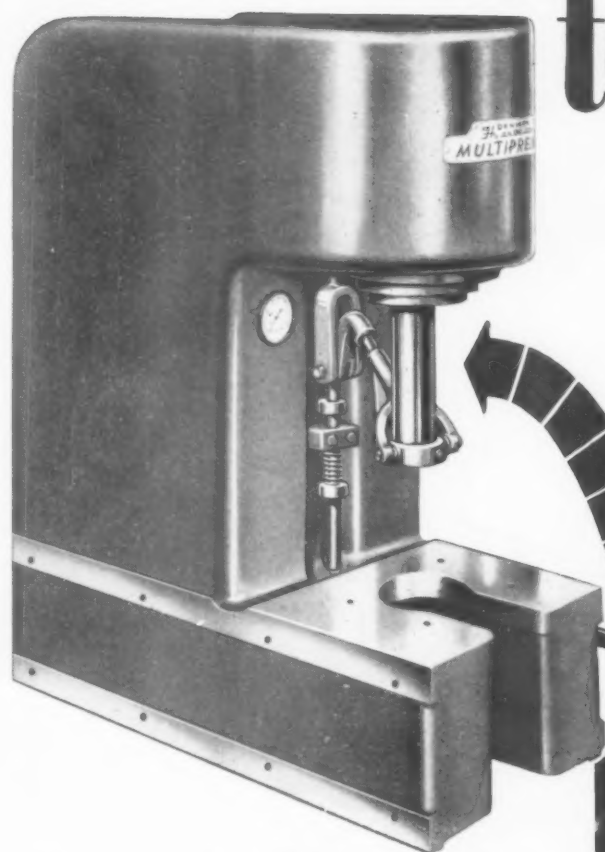
# *the* LEES-BRADNER

CLEVELAND 11, OHIO, U.S.A.

*Company*

# new **MULTIPRESS®**

## “touch control”



RAM MOVEMENT AND  
PRESSURE RESPOND  
INSTANTLY—IN DIRECT  
PROPORTION TO THE WAY  
YOU MOVE OR PRESS DOWN  
ON THIS HAND LEVER

PERFECT RAM CONTROL  
IN THE PALM OF YOUR HAND

Now you can have all the operating advantages of Multipress plus quick, sure, direct-action “Touch Control”. The slightest movement of this “slave-type” control is converted instantly and directly into ram movement . . . the ram starts, stops, reverses, speeds up, slows down, or exerts pressure in *exact, split-second relation* to every move of the hand lever. Every added ounce of pressure on the lever is instantly *multiplied* into added ram effort—in an exact ratio. It is as though the operator’s hand and arm move the ram itself with the power of a skilled giant. Rapid-fire “jiggling” of the lever brings equivalent “vibratory” pressure applications on the work.

Pressures are quickly and accurately shown on the dial gauge. The operator can build up pressures quickly or slowly, to any predetermined need. And because ram movement and pressure are so accurately related to every movement of the hand lever, he quickly gets the “feel” of any repeated operation.

Stroke length is fully adjustable at both its upper and lower limits, and maximum tonnage



Multipress is built in eight frame sizes and in one-ton to 50-ton capacities—all available with Touch Control.

can also be preset to any pressure within the limits of the press.

With “Touch Control” the fast, smooth oil-hydraulic accuracy of Multipress is made even more closely adaptable to all types of production jobs where complete control of the ram is needed, as in straightening operations.

Write for full details today.

**The DENISON Engineering Co.**  
1191 Dublin Road      Columbus 16, Ohio





#### PREFORM

In instances where more than one draw is required to produce the part, a stack of two or three blanks can often be preformed at one time.

#### PIERCE, TRIM AND BLANK

In some applications the Hydroform can be tooled to pierce and trim materials during the forming operation. Blanking intricate shapes from very thin materials is possible.

#### EDGE

Edging, or sharpening the radius between the flange and the wall of the part, is easily done on the Hydroform. Hydroform edging produces the same effect as restriking in a conventional die.

Here's what you can do by

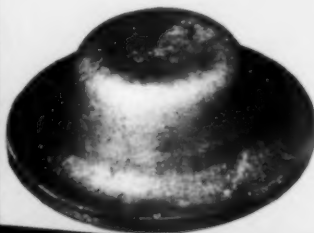
# Hydroforming

Cover of 0.064" 250 Aluminum.  
Hydroformed in 2 operations.



Strainer of 20 gage perforated cold rolled steel. Hydroformed in 1 operation.

Cover of 0.040" 350 Aluminum.  
Hydroformed in 1 operation.



Cap of 3/8" cold rolled steel.  
Hydroformed in 1 operation.



#### HOLD CLOSE TOLERANCES

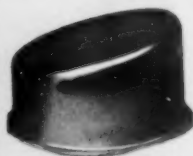
Close tolerances can be held by Hydroforming. The part at left is a diaphragm, shown before and after trimming. The two parts, of 0.010" stainless steel, were produced to mate with an air-tight fit. Part height can be held within  $\pm 0.005$ " tolerance.

#### SANDWICH

Parts consisting of two or three different materials can be drawn simply by placing blanks together. Cut-away view shows a part formed by placing a blank of aluminum between two blanks of cold rolled steel.



Angle assembly of 0.075" Aluminum.  
Hydroformed in 1 operation.



Aircraft detail of 0.040" Aluminum.  
Hydroformed in 1 operation.



Cover of 0.032" Aluminum.  
Hydroformed in 1 operation.

Vessel of 1/4" cold rolled steel.  
Hydroformed in 1 operation.





## PRODUCE DEEP DRAWN PARTS WITH VERY FEW LIMITATIONS AS TO SHAPE

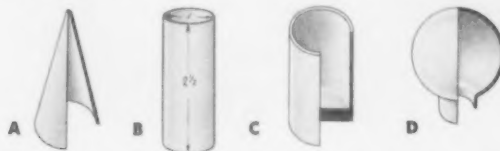
Hydroforming has revolutionized deep drawing. The parts and forming operations illustrated on the opposite page show the extreme versatility of this process. Note the wide variations in part shape. Note, too, that Hydroforming is *not* confined simply to the production of round or symmetrical parts.

## WORK WITH A WIDE RANGE OF MATERIALS

Parts can be Hydroformed of steel, aluminum, magnesium, copper, aluminized steel, brass, plastics, insulating materials and precious metals. High-strength alloys successfully Hydroformed include titanium, Inconel, Nimonic 75, L-605, stainless steels, stainless-clad copper.

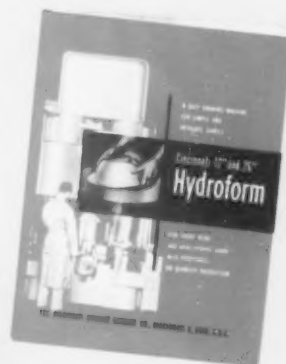
Blank thickness can range from foils to  $\frac{3}{8}$ " mild steel. Blanks ranging up to 32" maximum diameter can be drawn in standard machines. Larger equipment available on application.

There are several basic shapes that cannot be practically Hydroformed. It is not practical to form sharp, pointed conical shapes (Fig. A). Straight-walled cup shapes having a depth to diameter ratio of  $2\frac{1}{2}$  or more to 1 are not practical to form (Fig. B). Parts similar to shell casings which have a relatively thin wall as compared to a thicker closed end cannot be Hydroformed (Fig. C). Bulged parts having a small opening are impractical to form. Parts of this type with a large opening can be made using a segmented punch for removal after forming (Fig. D).



With the few exceptions noted above, practically *any shape* can be Hydroformed. In addition, Hydroforming brings to industry many other benefits affecting the time and cost of producing deep drawn parts. Only simple, low-cost tooling is required. Most parts are produced in a single draw. Part quality is materially improved. Surface finish is unimpaired.

Investigate Hydroforming now. It will change your thinking on deep drawing and forming. Let a Cincinnati Milling Machine Co. field engineer give you detailed information on how Hydroforming can be profitably applied to your production.



Write for your copy of  
Hydroform Bulletin M-1759



**CINCINNATI 12" HYDROFORM** Also built in 19", 23", 26", 32" standard sizes.

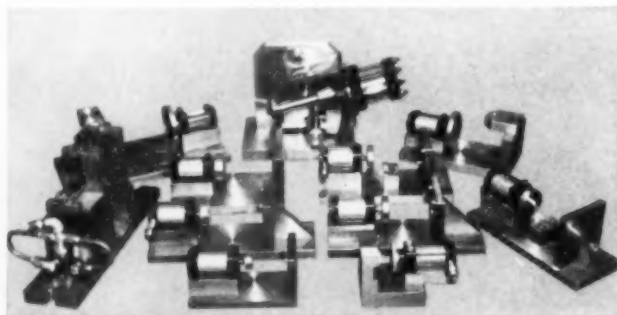
**THE CINCINNATI MILLING MACHINE CO.**  
CINCINNATI 9, OHIO

# ROMEC DIVISION—LEAR, INC. USES AIR TO CUT "IDLE" MACHINE TOOL TIME

## Bellows "Controlled-Air-Power" Devices Increase Production Up to 565%

To the Romec Division—Lear, Inc., leading manufacturers of aircraft fuel and water injection pumps, precision accuracy is a must. While carefully guarding accuracy and quality, they also keep a watchful eye on cost control.

Lear, Inc. pays particular attention to set up time—and to work positioning and holding operations. For here, they know important savings can be made. Here their own tool room ingenuity,



▲ A few of the dozens of set ups at Romec Division, Lear, Inc. using Bellows midget air cylinder—the Han-D-Air. Only 4" long x 1½" square, its fast, automatic action saves production time in operating jigs and fixtures, positioning and clamping work, and ejecting finished parts.

plus Bellows "Controlled-Air-Power", has paid big dividends.

Lear, Inc. has built literally dozens of ingenious set ups using Bellows "Controlled-Air-Power" Devices. Set ups inexpensive to install, yet so flexible in design they can easily be transferred from one job to another—replacing slow, manual operations and cutting "idle" machine tool time. As a result of using Bellows Equipment, production increases range from 265% to 565%.

This story isn't unusual. It's typical of hundreds in our case history files—conclusive evidence that, no matter what you make, chances are Bellows "Controlled-Air-Power" can help you make it faster and at less cost.

May we send you a copy of our new bulletin "Faster, Safer, Better Production"? It's worth reading. Address The Bellows Co., Akron 9, Ohio, Dept. TE-1252.

In drilling a die cast aluminum pump body, Lear uses a Han-D-Air Cylinder to quickly clamp the work in position and a Bellows Drill Press Feed to automatically advance the drilling bead. Synchronized to work together as a smoothly controlled team, these two units have jumped production from 100 to more than 300 parts per hour.



**The Bellows Co.**  
AKRON 9, OHIO  
Bellows "Controlled-Air-Power"  
for Faster, Safer, Better Production



## This new booklet shows you how Kodak Contour Projectors can simplify your inspection and measurement problems

Just off the press is the most informative booklet on Kodak Contour Projectors we've ever published.

- It shows by example and case history how you can inspect large parts, small parts, long parts, curved parts, delicate parts, complex parts, all sorts of parts on the Kodak Contour Projector.
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- It describes the features that make Kodak Contour Projectors adaptable to such a wide variety of work.
- It lists the accessories that extend their versatility.
- It discusses the measuring attachments that provide critical accuracy.

Whether your interest lies in toolroom measurement or production assembly and inspection, Kodak Contour Projectors will do the job quickly, completely, and accurately with little training of operators. For complete details, send for your complimentary copy of this new 12-page booklet. Just write to Eastman Kodak Company, Industrial Optical Sales Division, Rochester 4, N. Y.

### the KODAK CONTOUR PROJECTOR



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148

**ELIMINATE \* HUMAN ERRORS  
WITH INDICATING  
MICROMETER  
& COMPARATOR**



**COMPARATOR  
MASTER  
MICROMETER  
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1" RANGE IN  
10000ths - NO GAGE  
BLOCKS NEEDED**

\* HUMAN ERRORS THROUGH  
DIFFERENCES OF "FEEL"  
ELIMINATED.  
WILL DETECT OUT-OF-  
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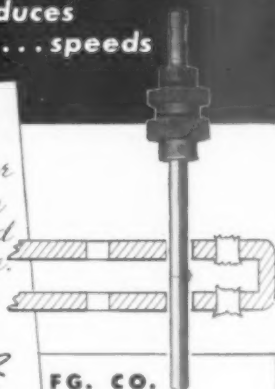
**Deburring with NOBUR tool**  
on drill press reduces  
production costs... speeds  
deliveries!

**MEMO**

TO: Planning Dept.  
FROM: Methods Engineer

NOTE: 75% saving in  
time on Op. #4 and  
16% in overall time.

Let's take fuller  
advantage of  
**NOBUR**



**FG. CO.**  
OUTLINE

OPER. NO.	MACHINE	DESCRIPTION	TIME
1	TURRET	BORE & FACE PER PRINT	5 MIN
2	MILL	STRADDLE MILL PER PRINT	3
3	DRILL	10 HOLES LINE DRILL	6
4	BENCH	DE-BURR HOLES	4
4 (REV)	NOBUR	NOBUR HOLES	1
TOOL IN DRILL PRESS			
<b>TOTAL</b>			<b>18 15</b>

For further information, write or wire today

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**The Tool Engineer**





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The eight pages of this illustrated booklet, "A-L Drill Rod and Cold Drawn Products," are a valuable contribution to your file on how to save needless operations in making your product and how to enhance customer satisfaction.

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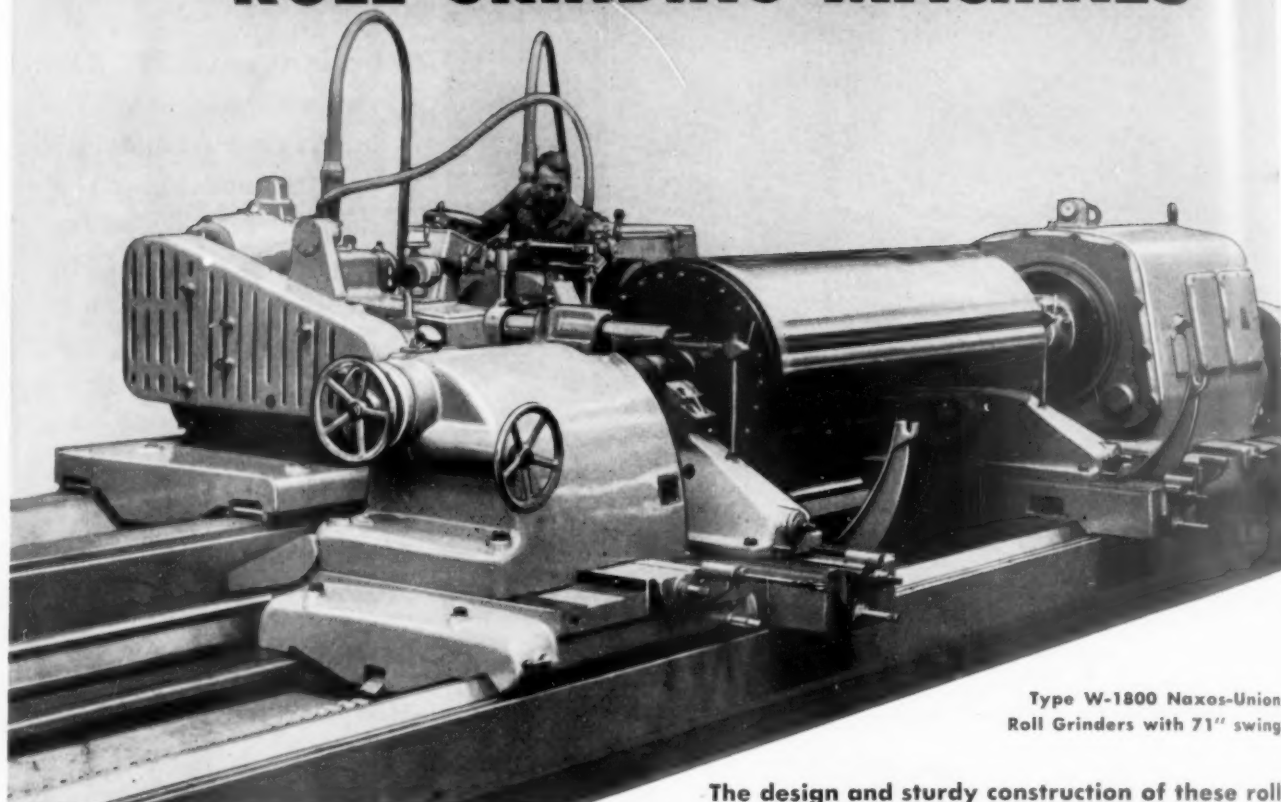
If you want better quality, accuracy, and finish on your products—with economy—call us. No obligation. • Allegheny Ludlum Steel Corporation, Henry W. Oliver Building, Pittsburgh 22, Pa.

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**Allegheny Ludlum**



W&O 3531

# For **ACCURATE ROLL GRINDING** **NAXOS-UNION** **ROLL GRINDING MACHINES**



Type W-1800 Naxos-Union  
Roll Grinders with 71" swing

The design and sturdy construction of these roll grinders provides vibration-free operation for producing accurately ground roll shapes with extremely high surface finishes. Further to improve grinding accuracy, the machines have an automatic compensating device for wheel wear and a micro feed for feeding grinding wheel within limits of 0.00004". Convex and concave roll contours are ground precisely with a specially designed cam-controlled grinding attachment. These machines are built by Naxos-Union, Germany, who have many years of experience in building roll grinders and other precision grinding machines.

## CAPACITIES

Model	W-500	W-1000	W-1800
Maximum Grinding Diameter	20"	40"	71"
Minimum Grinding Diameter	4"	6"	6"
Maximum Weight of Workpiece			
(a) Between Centers	2 Tons	10 Tons	20 Tons
(b) With Steady Rests	—	20 Tons	50 Tons

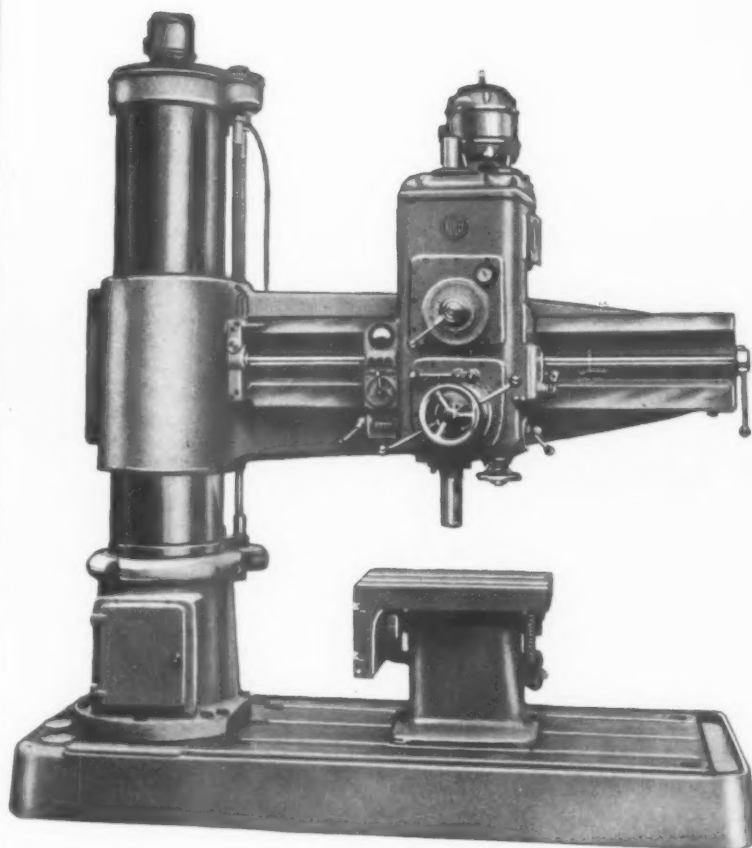
*Send us the details of your roll grinding jobs. Cosa engineers will gladly recommend the most suitable equipment.*

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Your source for all Precision Machine Tools—  
from Small Bench Lathes to Large Boring Mills

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Model NKR-53 Kolb Radial Drill has 12 speeds from 30 to 1500 R.P.M. and 12 feeds from .003" to .118" per rev.

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- Heavy bases, columns and arms—Rigidly constructed
- Column diameters from 7½" to 35"
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- Hardened and ground gears
- Hardened and ground spline
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## FOR SPEEDIER PRODUCTION

- Selector device for pre-setting speeds and feeds
- Rigid locking of column and spindle head by electro-hydraulic clamping system (automatically or by hand)
- Push button controls
- Automatic depth release

## FOR YOUR PRODUCTION

- Maximum drilling capacities in cast iron—1¾" to 8" diameter
- Maximum drill radii—27" to 180"
- Spindle speeds—12, 24 or 36—from 30 to 3000 R.P.M.
- Feeds—6, 9, 12 or 18—from .0012" to .1181" per rev.

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## CALIBRATED STEEL BALLS

Set No. B 23. Calibrated Steel Balls, 23 sets of 3 each  
1/16 to 1/2" by 32nds, and 9/16 to 1" by 16ths.

Complete in Mahogany Case.....\$150.00

Use VK calibrated steel balls for the precise measurement of internal annular grooves and for comparative measurements on throated worm wheels.

VK calibrated steel balls are selected grade A balls, which are within .0003" of nominal size, but which have calibrations accurate within 25 millionths of an inch.

Complete details on this and other Precision Measuring Tools are given in the Van Keuren 1952 Catalog and Handbook No. 35.

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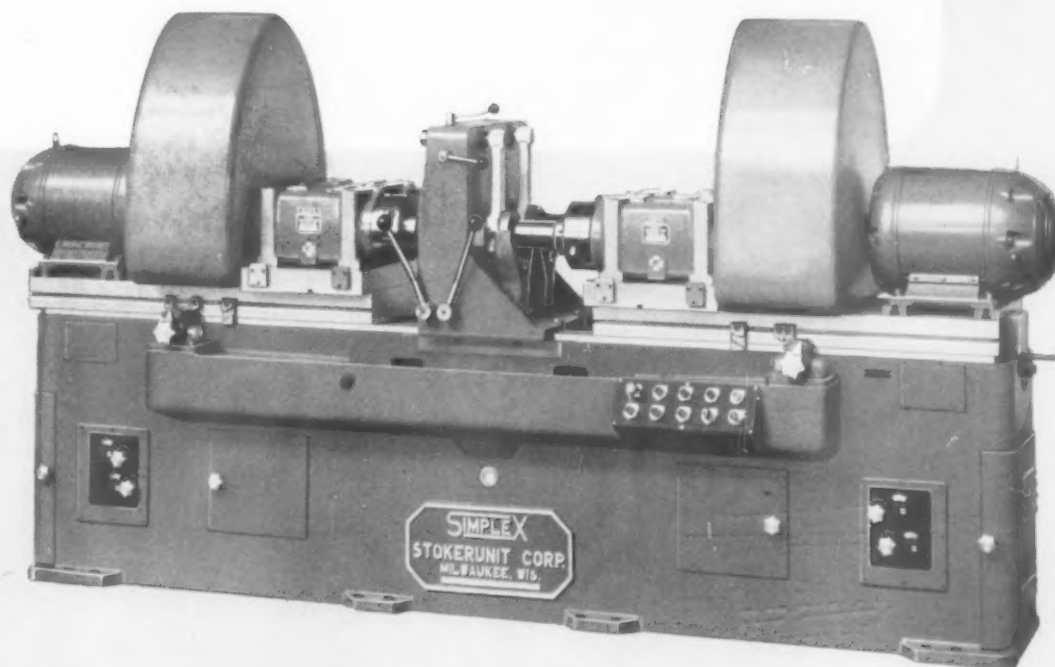


# DON'T *Guess!*

## Use *Simplex*

### PRECISION BORING MACHINES

FOR ACCURACY, DEPENDABILITY, PERFORMANCE



The crank pin bore of a heavy steel connecting rod was successfully bored and held to close machining tolerances on the SIMPLEX #2U 2-way Unit Type Precision Boring Machine pictured above. The two SIMPLEX #4 precision boring heads on the left hand table of the machine were used to semi-finish bore and chamfer one side of the crank pin bore, and the remaining two heads on the right hand table were used to finish bore and also chamfer the opposite side of the part. Both machining operations were performed without removing the connecting rods from the fixture. This method of machining insured a higher accuracy and also a good finish in the bore.

## *Simplex*

### PRECISION BORING MACHINES

SIMPLEX MACHINE TOOL DIVISION

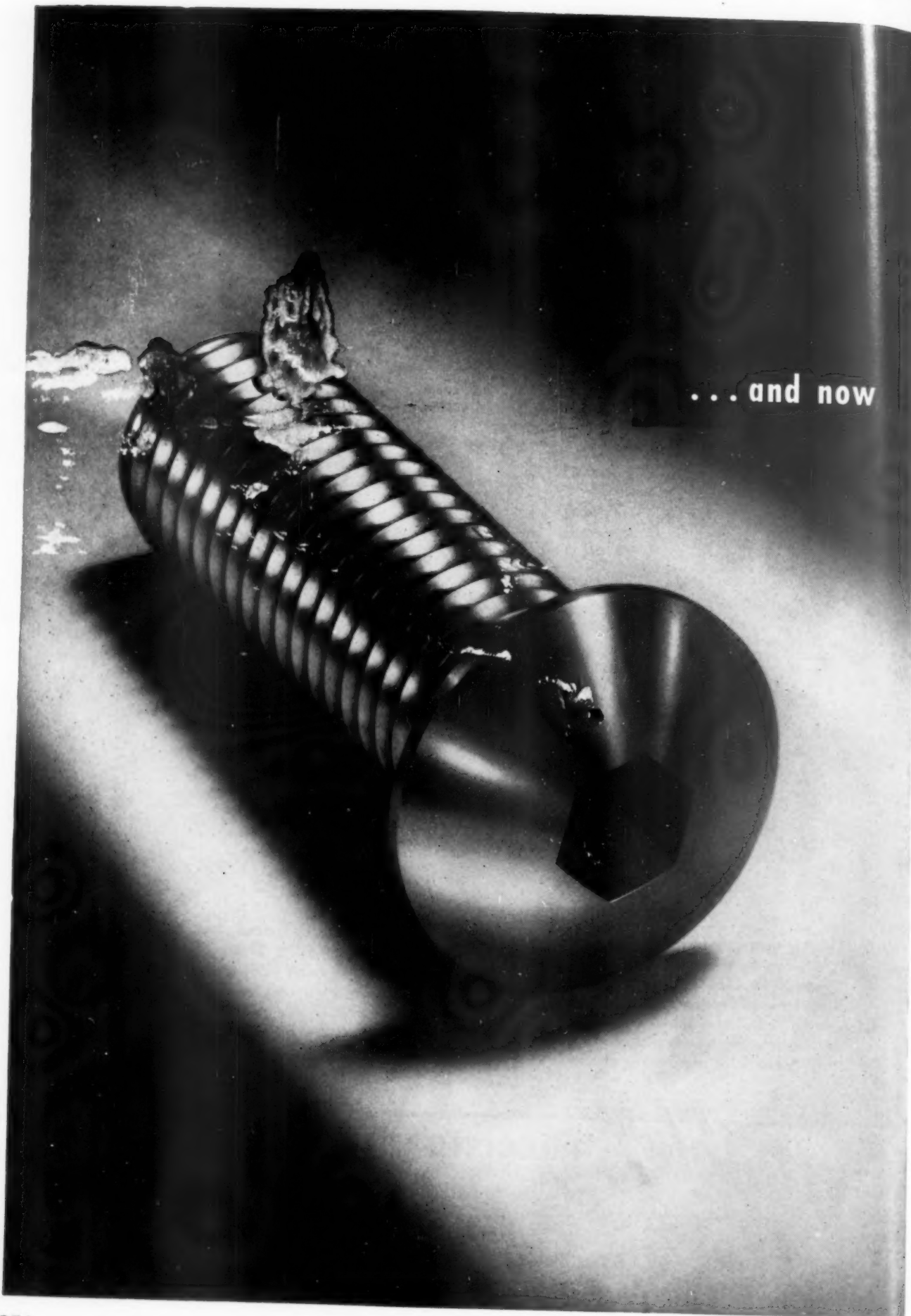
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4528 WEST MITCHELL STREET

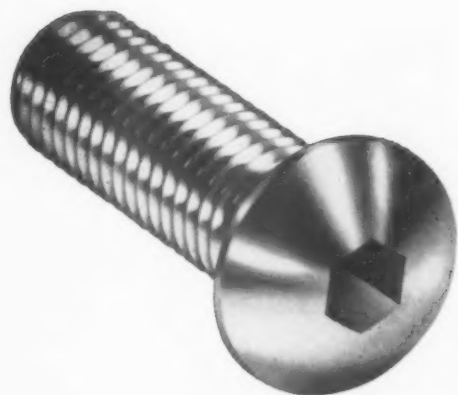
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• PLANER TYPE MILLING MACHINES

• SPECIAL MACHINE TOOLS





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- Stocks at your UNBRAKO industrial distributor
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SOCKET SCREW DIVISION

**SPS**  
JENKINTOWN PENNSYLVANIA

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ENGINEERING AND PRODUCTION "KNOW HOW" HAS MADE**

# **WALES**

**HOLE PUNCHING AND NOTCHING EQUIPMENT**  
**the most complete line**



Showing a setup of Wales independent, self-contained Hole Punching and Notching Units with the finished flat sheet in the foreground. Note, nothing is attached to press ram.



Showing a setup of Wales Horizontal Type Units for punching holes in curved and straight flanges and rims with the curved flanged work nested in position ready to be punched around the entire rim. Note, these units are mounted on templates.



Showing two progressive, self-contained Wales Box-type Assemblies. With Wales Hole Punching Units, any good mechanic can make a hole punching die for press brakes or stamping presses.

\* Only creative ability can produce an original and complete line of new patented products. That, basically, is what has made Wales Equipment the leader in tooling for hole punching and notching.

Many metal fabricators have made it standard practice to call in Wales Service Engineers whenever tooling is being planned for hole punching and notching in angles, channels, extrusions and sheets. These fabricators have found it is more economical and time saving to call on Wales before designing and building special hole punching and notching dies because STANDARD Wales Units can be used at greater savings.

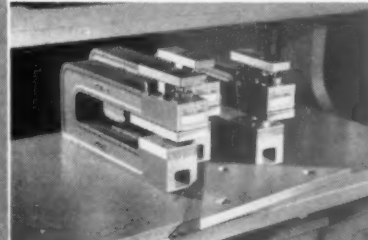
Take advantage of the years of Wales research, engineering and "know how" by writing TODAY for fully-illustrated, functionally colored catalogs of this complete line of Wales Equipment.



Wales Fabricator provides rapid interchangeability for punching and notching. Work from blueprints or operation sheets. No templates required.



Wales Drilling Machine with Boring Head is specially designed to meet the exacting requirements of locating, drilling, reaming and boring holes in material of practically any length and up to 36" wide.



Showing a setup of Wales Type "HS" Hole Punching Units for punching mild steel up to 3/4" thick. This high capacity unit is typical of the versatility and wide range of uses of Wales Hole Punching and Notching Equipment.

## **WALES-STRIPPIT CORPORATION**

George F. Wales, *Chairman*

**393 Payne Avenue, North Tonawanda, N. Y.**

*(Between Buffalo and Niagara Falls)*

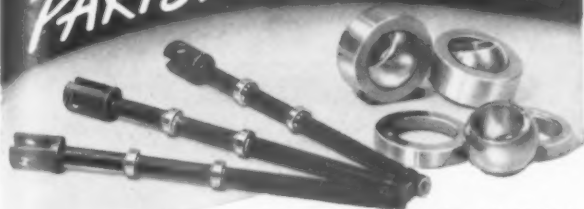
Wales-Strippit of Canada, Ltd., Hamilton, Ontario

**Specialists in Punching and Notching Equipment**



# AIRCRAFT

*PARTS... LIKE THESE...*



Valve Stem for Fuel Injection System, Jet Propulsion Engine.  
MATERIAL: Stainless Steel

Ball and Race Unit for Radar Instrument. Lapped to No. 3 Micro Finish .0001 Accuracy all over. MATERIAL: Nitralloy

*... ARE PRECISION-MADE by...*

## FULLER

Close tolerance parts for aircraft, radar, electronics, precision instruments, etc. Screw machine, milling, boring, grinding, honing, and lapping operations, with accuracies to .00005. Fine finishes to No. 3 Micro. Heat resistant and stainless steel, Nitralloy, bronze, etc.

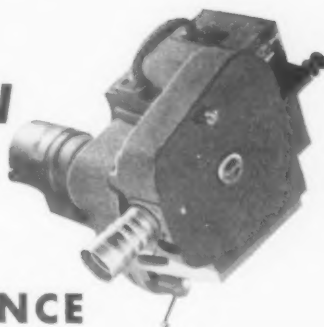


**FULLER TOOL CO.**

4000 W. ELEVEN MILE RD.  
BERKLEY, MICH. LINCOLN 2-5600

USE READER SERVICE CARD; INDICATE A-12-157-1

**THIS CAMERA  
HELPED  
BALDWIN  
IMPROVE  
ENGINE  
PERFORMANCE**



When you can see the cause of trouble in slow-motion movies, the solution is often obvious.

Baldwin-Lima-Hamilton engineers used this technique in improving valve performance in a diesel locomotive engine. To see what happened to the valves in action, they used a Kodak High Speed Camera.

This versatile camera enables you to take up to 3200 pictures a second. Motion is slowed as much as 200 times by projecting the 16mm film at normal speed. Visual analysis is quick and easy, and the films can be shown over and over again for study as often as you wish.

The Kodak High Speed Camera may be the answer to your design, production, and product performance problems. To see how it has worked for others, send for your copy of the booklet, "Magnifying Time." Write to Eastman Kodak Company, Industrial Photographic Division, Rochester 4, N. Y.

**the Kodak  
HIGH SPEED  
Camera**

**Kodak**  
TRADE-MARK

USE READER SERVICE CARD; INDICATE A-12-157-3



**HELICAL SPIRAL  
TAPER PIN  
REAMER**

*featuring*

**Continuous change in lead angle to compensate for continuous change in diameter.**

- This feature insures uniform depth of radial undercut (shear) on the entire length of the taper and provides uniform relief at all points on the diameter.
- In stock for immediate delivery sizes #6/0 thru #10. Made promptly to order sizes #11, 12, 13, and 14.
- Backed by 27 years of manufacturing reamers exclusively. We also make Stub Reamers, Die Clearance Reamers, and Special Reamers to your exact specifications.

MANUFACTURERS' AGENTS: Exclusive territories open outside of New England and metropolitan New York. Write us.



**THE BUOL MACHINE CO.  
REAMERS EXCLUSIVELY  
PARK & MEADOW NEW BRITAIN, CONN.**

USE READER SERVICE CARD; INDICATE A-12-157-2

**There's a reason 71%\***  
of all popularly-priced Tool and Cutter Grinders  
sold in 1951 were "Knock-Outs"



MODEL B860

Will do  
anything that  
machines  
costing 2 or 3  
times more  
will do  
yes and in  
less time.

Distributed  
Only Through  
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Dealers

**K. O. LEE CO.**  
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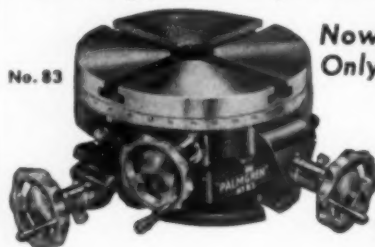
\*Sales  
Statistics  
Furnished  
on Request

USE READER SERVICE CARD; INDICATE A-12-158-1

## DUAL CROSS and ROTARY FEED

# PALMGREN

### Rotary, Index, Milling Table



Now **\$54<sup>50</sup>**  
Only

**Turns Your  
DRILL PRESS  
Into A  
VERTICAL MILLER**

Think what this will mean in your shop! Can be used on any Drill Press, Lathe or Milling Machine and provides what is practically a universal milling machine.

Designed for use in all types of metal and woodworking shops. A precision table permitting fine work to close tolerances. It is accurate, speedy, well constructed and attaches quickly in a firm position.

Rotary feed calibrated in degrees; Cross feed in thousandths; Dual Cross Slide with cross feed  $2\frac{1}{8}$ " each side of center or  $4\frac{1}{4}$ " overall. Has acme thread cross feed screws, adjustable gibs on cross slides. 40 to 1 worm and gear ratio in rotary feed. Equipped with bolt slots and locking screws.

No. 83 Table Dia. 8", T-Slots  $\frac{3}{4}$ ", Base Keyway  $\frac{3}{8}$ ", Base Dia.  $6\frac{3}{4}$ ", Ht. 5", Wt. 37 lbs. Price Only \$54.50. Other Types available. No. 82 Dual Cross Feed only \$39.75; No. 86 Rotary Feed Only \$42.50.

Order Today! If dealer can't supply, write us. Ask for Circular No. 10

**CHICAGO TOOL and ENGINEERING CO.**

Mfrs. of PALMGREN PRODUCTS Since 1918

8391 South Chicago Ave. • Chicago 17, Ill.

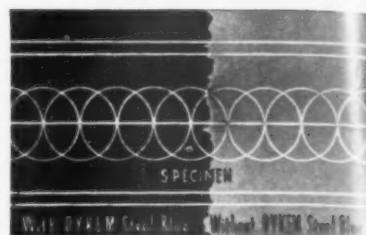
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## DYKEM STEEL BLUE

### STOPS LOSSES

**making dies  
& templates**

Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout show up in sharp relief and at the same time prevents metal glare. Increases efficiency and accuracy.



Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.

USE READER SERVICE CARD; INDICATE A-12-158-3

## MICRO FLAT

### BLACK GRANITE SURFACE PLATES

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping or frequent re-finishing. Can use for spotting and "blueing in."

Immediate delivery in most sizes from 9x12 to 48x144.

Request Bulletin and name of Distributor nearest you.



COLLINS MICROFLAT CO.

2326 E. 8th Street

Los Angeles 21, Calif.

USE READER SERVICE CARD; INDICATE A-12-158-4

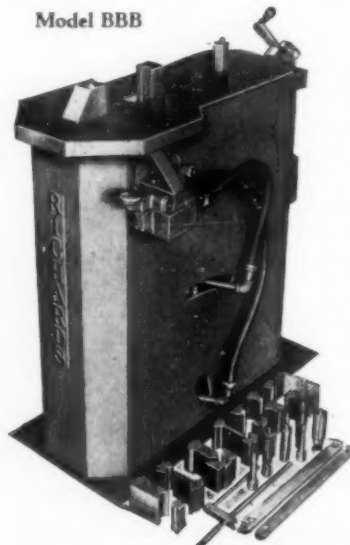
## MULTIFORM BIG BROTHER BENDER

**Produces Without Special  
Tooling—Saves Die Costs  
Saves on Expensive Presses**

Model BBB



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender, using the standard tooling.



The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches—punching and blanking dies extra. Will punch holes up to 1" and form material up to  $\frac{1}{4}$ " thick by 4" wide. We also build smaller hand or air operated models for forming up to  $\frac{1}{8}$ "x1 $\frac{1}{2}$ " material.

Send for illustrated folder TE-5

**J. A. RICHARDS CO.**

903 North Pitcher St.  
Kalamazoo, Michigan

USE READER SERVICE CARD; INDICATE A-12-158-5

The Tool Engineer



# QUIET riveters at work

... not a sound as rivets are cold formed in  $2\frac{1}{2}$  seconds ... each the exact counterpart of its neighbor...because Hannifin "Hy-Power" Riveters are at work.

These modern production tools, widely used in the highly competitive automotive industry to reduce costs and improve production, greatly simplify and speed up riveting. What's more, by riveting cold with this "silent squeeze" method, operators get a better, stronger riveted joint, every time. Hannifin "Hy-Power" portable and stationary yoke riveters are available in capacities from  $7\frac{1}{2}$  tons to 100 tons (more in multiple). Powered by the exclusive, patented "Hy-Power Hydraulic Generator, their quiet, automatic cycle is started with a touch of a button—yet, for safety, the stroke can be interrupted and the ram reversed at any point in the cycle, simply by releasing the control button.

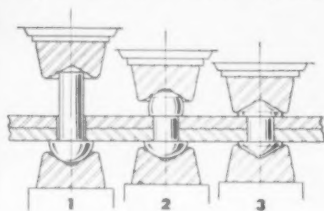
If you rivet, stake, punch, press or bend, there's a place in your production picture for Hannifin "Hy-Power" equipment. Hannifin Field Engineers are located in leading industrial centers to advise you. Hannifin Corporation, 1119 S. Kilbourn Ave., Chicago 24, Illinois.

do ALL you can do . . . with

# HANNIFIN

Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

## The quiet "Hy-Power" Hydraulic Work Cycle



Hydraulic pressure, under instant, reversible, finger-tip control, silently squeezes rivets in this manner:

1. Fast approach (completed)
2. Rivet being squeezed
3. Rivet formed; ram returns



### WRITE FOR BULLETIN 150

This bulletin tells the complete story of how Hannifin "Hy-Power" Hydraulic equipment can help you. Write today . . . a copy will be on its way tomorrow.



# Tap breakage reduced to-



**ONE TAP**  
**PER**  
**15,000**  
**PARTS!**

*A Warner & Swasey No. 10 Precision Tapping and Threading Machine tapping four tiny Class 3 holes in the type cap piece for National Adding Machines (shown 1/2 size at right).*



**T**HAT'S the record of the Warner & Swasey No. 10 Precision Tapping and Threading Machine at The National Cash Register Company, Adding Machine Division, Ithaca, New York. The job consisted of tapping four tiny holes for No. 1-72 pitch threads to Class 3 fits on one small part in the adding machine's precision mechanism.

This operation was previously done on a drill press rigged with a tapping head. Tap breakage, despite operators' skill and care, averaged

20 taps a week with 7,000 parts produced.

But when the job was transferred to a Warner & Swasey, 15,000 parts were tapped with only 1 broken tap. The production bottleneck was quickly broken when production was upped from 175 to 300 pieces per hour.

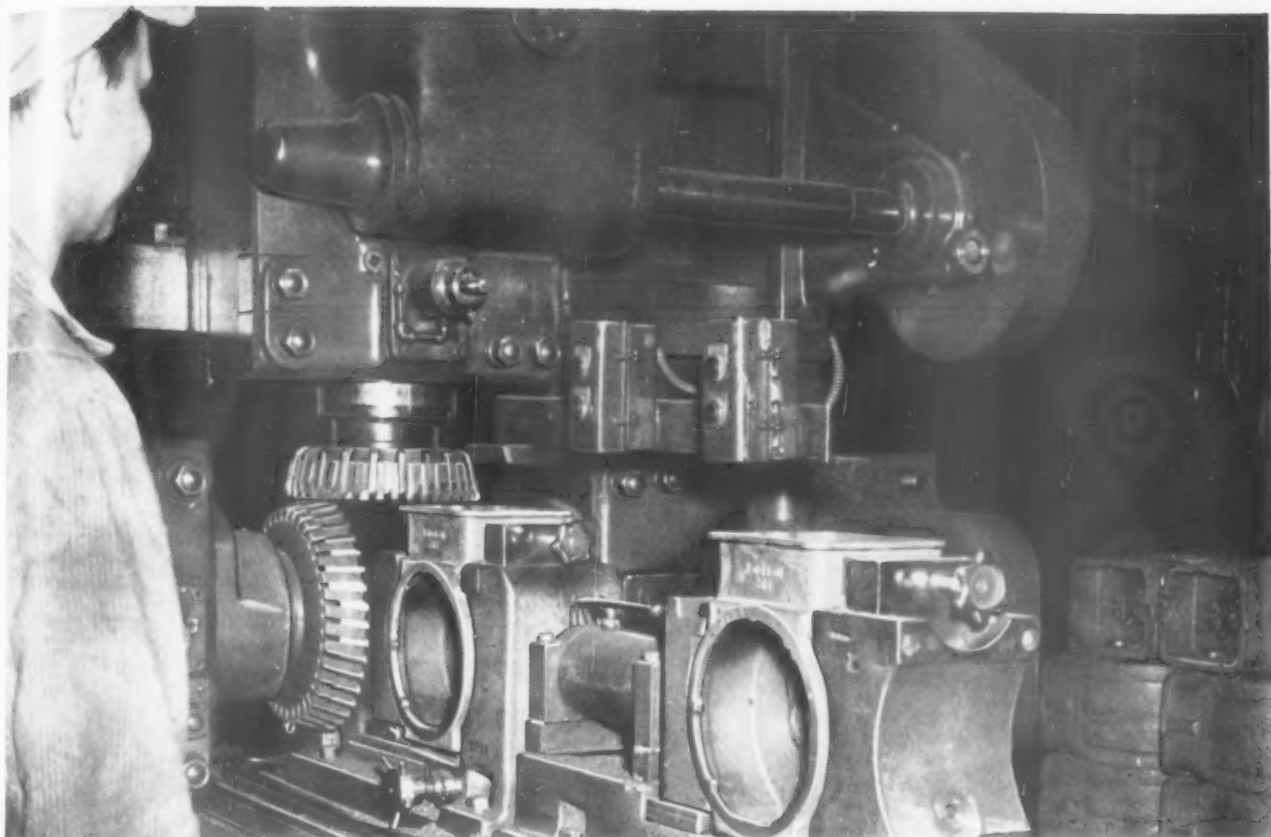
For this company, the No. 10 was a *real* investment. Wherever your operations require precision tapping of Class 3 or 4 threads *on a production scale*, you can depend

on Warner & Swasey Precision Tapping and Threading Machines to reduce tap breakage, and practically eliminate costly rejections of parts due to inferior tapping in the final operations.



**YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES**





## 450 pieces per grind...

### *Despite Vibration*

HAYNES STELLITE alloy milling cutter blades are being used successfully to machine gas-meter bodies, despite considerable vibration. The meter bodies have thin walls with respect to their other dimensions, and even though they are held in a rigid fixture, vibration cannot be completely eliminated. HAYNES STELLITE alloy tools have the toughness to withstand the chatter and also the red hardness to do the job fast.

Three milling heads, each containing 36 standard HAYNES STELLITE blades, face the flange at the top of the meter and straddle mill the two sides simultaneously. The tools previously used produced as few as 11 pieces per grind. HAYNES STELLITE tools produce an average of 450 pieces.

For information on how to use HAYNES STELLITE tools on your machining jobs, write for the new manual, "HAYNES STELLITE Metal-Cutting Tools."

**HAYNES**  
TRADE-MARK

*Alloys*

#### Haynes Stellite Company

A Division of  
Union Carbide and Carbon Corporation



General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago — Cleveland — Detroit — Houston  
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"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

# Only **DIMENSIONAIR** Gives You All This

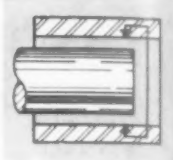


**FULL 7 1/2" SCALE OF CALIBRATED ACCURACY**

**All of it measures accurately.  
Not just part of it!**

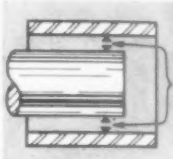
## **LONGER APPROACH RANGE**

You measure earlier **BEFORE** reaching minimum work size. Less scrap. Same plug used on both rough and finished dimension. Total minus range .0015".



## **GREATER CLEARANCE (.0018" up to .0038")**

You can read Undersize, Taper, Out-of-Round and Irregular Shape Holes without plug getting stuck. Easier to insert plug.



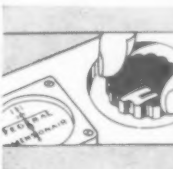
## **STAY-PUT ZERO — DON'T WORRY ABOUT PRESSURE FLUCTUATIONS**

They do not affect accuracy. Set zero when you start—that's all. No drifting. Full Jeweled Cushioned Movement — more sensitive to size variations.



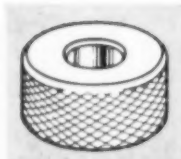
## **10 SECOND SET-UP — JUST ONE ADJUSTMENT**

As simple as setting a Dial Indicator. Direct and Positive.



## **ONE MASTER ONLY — FORGET THE IDEA TWO ARE NEEDED**

Only air gage with enough precision to permit use of only one master. Interchangeable plugs — every plug calibrates on same scale.



## **LONGER PLUG WEAR — JET FACES ARE DEEPER**

Saves you real money.

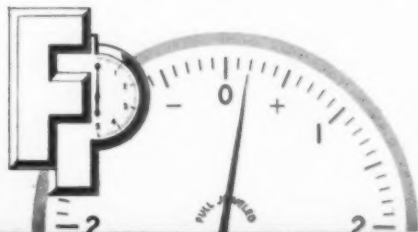


## **Try it — and prove it to yourself**

Only the Dimensionair provides the many important features above. Customers who have given the Dimensionair a thorough trial have found its advantages outstanding and have ordered many Dimensionairs in large quantities, and repeatedly. We invite you to try the Federal Dimensionair and compare it with any other air gage. Ask our nearest representative or write today for complete information and prices. **FEDERAL PRODUCTS CORPORATION**, 1912 Eddy Street, Providence 1, R. I.

# FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of **DIMENSIONAL INDICATING GAGES**



quality steel is more than pride at JESSOP



Steelmaking is a fine art in the Jessop mill. For example, the high alloy steel which went into the tool bits pictured above was produced in a small batch with the greatest of care. Each ingredient was weighed out meticulously. The formula was exactly prescribed according to the specific function of the end product and the melting took place under precise time and temperature control. Extreme quality control is more than a matter of pride-of-accomplishment with Jessop men. They want more customers and they want them to be satisfied. They want Jessop to be known as the absolute leader in the making of special steels. They work hard at it, every day.

HIGH SPEED STEELS • HIGH SPEED BITS • PRECISION GROUND FLAT STOCK  
HIGH SPEED AND ALLOY SAW STEELS • HOT WORK DIE STEELS • COLD  
WORK DIE STEELS • CARBON AND ALLOY STEELS • STAINLESS AND HEAT  
RESISTING STEELS • VALVE STEELS • STAINLESS-CLAD STEELS • CAST-TO-  
SHAPE STEELS • COMPOSITE TOOL STEELS • ARMOR PLATE

# JESSOP

STEEL COMPANY • WASHINGTON, PENNSYLVANIA

**this  
pad**

**and this  
radius**



## **broached in a single pass ... the AMERICAN way**



Combining *two* operations on an American SB 48-15 Single Ram Vertical Hydraulic Surface Broaching Machine enabled this automotive engine manufacturer to broach the radius and pad (which are non-adjacent) of the front engine cover in *one* pass.

The tooling for this operation consists of generating type broaches and shaving blades mounted on the main machine slide for broaching the radius and joint surfaces. In addition, a special hardened and ground guide is mounted on the table to guide generating type broaches and shaving blades which are pulled down by adapting the lower end of the holder to the machine slide. These broach the pad thus completing the two operations in one pass.

Automatic clamping, plus an automatic sliding table are two additional features of this American installation that help maintain a production rate of approximately 115 parts per hour at 85% efficiency.

### **YOU CAN SOLVE YOUR BROACHING PROBLEMS THE AMERICAN WAY**

This is only one of thousands of problems solved during American's 25 years of experience in the manufacture of broaching machines, broaches, and broaching fixtures. A part-print or sample and hourly requirements are all it takes to start American engineers working on your problem. Write today!

Write for your copy of  
American's Circular 300.



**American** BROACH & MACHINE CO.

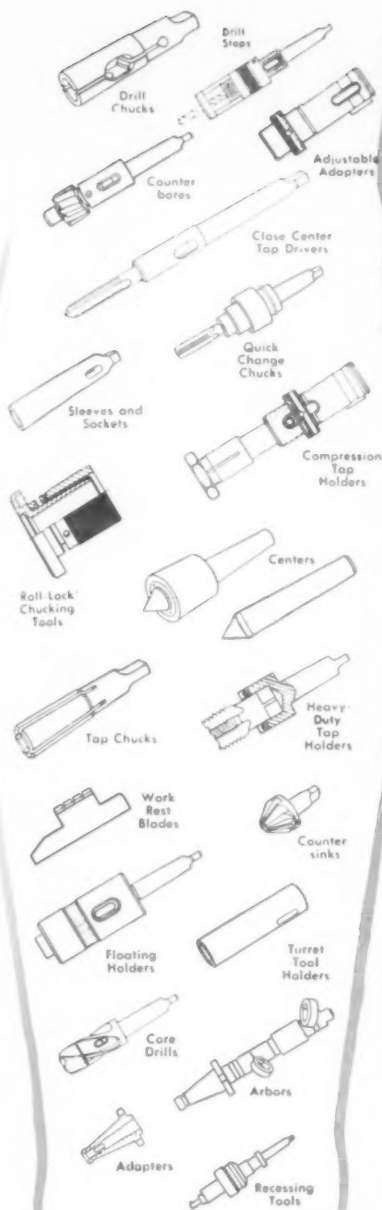
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

**ANN ARBOR, MICHIGAN**

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery







## the "ARMS and HANDS" for your MACHINE TOOLS

If you think of a Lathe, Mill, Multi-Spindle Machine, or other Machine Tools as being a human body, supplying power to the parts of the body doing the actual work, then Scully-Jones tools represent the "Arms and Hands".



## ACCURACY, SPEED, ECONOMY on END-CUTTING OPERATIONS

with **SJ** SCULLY-JONES

### COUNTERBORES • COUNTERSINKS • CORE DRILLS

These Cutters and Drivers have rigidity of a one-piece tool. Shanks and holes ground concentric to assure true-running cutters; helps produce work to specifications and reduce rejects.

Cutters are solid High-Speed Steel, carefully heat treated and ground to prolong life of cutting edges; assures fast, continuous production; reduces "down time" for re-grinding.

Standard Stub Taper shanks on cutters are easy to insert and eject, saves time changing cutters. Tangs on shanks provide a positive drive; eliminates slipping and tool damage.



1 S-J Counterbore Cutters—solid, High-Speed Steel or Tungsten Carbide Tipped.

2 S-J Countersinks—solid or piloted; solid, H.S.S.—with 60, 82 or 90° included angle.

3 S-J Counterbore Drivers—Shown with cutter and pilot. Drive S-J Counterbore Cutters, Countersinks, Core Drills and tools having Standard Stub Taper Shanks.

4 S-J Stub Taper Turret Tool Holders—Shown with countersink and pilot. Eliminate need for conventional type holders and shorten projection between turret and work. Designed for holding S-J Counterbore Cutters, Countersinks, Core Drills and any

similar tools having Standard Stub Taper Shanks.

5 S-J Core Drill Cutters—solid H.S.S., 4 flutes, 20° spiral—for enlarging and trueing drilled, cored or punched holes. Quickly enlarge holes, because 45% of diameter is cutting.

6 S-J Core Drill Holders—Used where chip removal is a problem. Shown with cutters; 4 flutes, 20° spiral. Style 1 for deep hole drilling. Style 2 for shallow hole drilling. May be run through bushing.

7 S-J Style "B" Core Drill Holders—Used where chip removal is no problem. Shown with cutter; shorten overhang and assure rigid set-up. Only 4 holders required to drive the 25 cutters.

**Scully-Jones**  
AND COMPANY

RS904

1915 S. ROCKWELL ST., CHICAGO 8, ILLINOIS

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

WRITE FOR BULLETIN No. 5-50

Shows complete information on S-J Counterbores, Countersinks and Core Drills.

## A YEAR-ROUND "TOOL SHOW"

You can see the S-J Standard Tools (sketched in the column at the left) on display or in operation the year-round, at the Scully-Jones plant. For year-round reference too, you'll find complete information on these and other tools, in the S-J Catalog 600—yours on request, on your company letterhead.

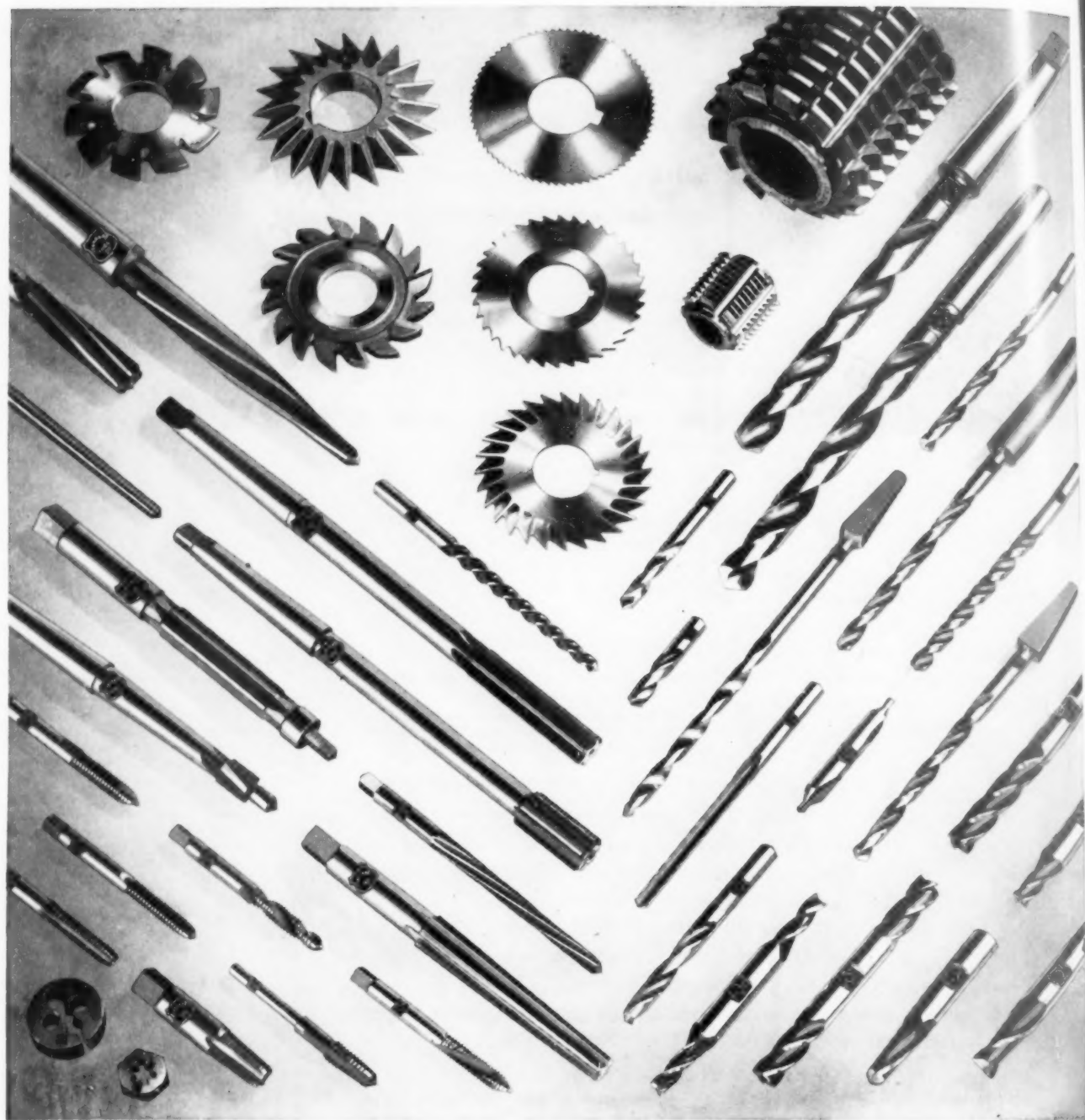
These "arms and hands"—as we like to call them—will help you equip your machine tools for low cost, fast, accurate production.

Whether you select Scully-Jones Standard or Special Tools you can be confident of getting the best that can be produced—the result of 40

years' experience, engineering research, modern equipment, correct materials and expert workmanship. Recently Scully-Jones manufacturing facilities have been further expanded to give you more reasonable deliveries.

Whenever your tooling problems or design programs require outside service, S-J Engineering and Design Service has "heads and hands" to help you. Whether large or small, let us discuss your engineering problems and design programs.

For quick action see the nearest Scully-Jones representative or contact us direct.



## Solution for tough jobs—Since 1881

**S**END us your tough drilling, reaming, tapping and milling jobs—we have helped men in industry solve them for 71 years. If the problem is a new metal, faster production or greater accuracy, have a Standard Service Man look at it. He is qualified by our 71

years of experience.

We have grown with industry by keeping ahead of these developments. Industrial Distributors coast to coast give prompt delivery on our complete line of Shield Brand Tools. Why not Standardize and start saving now?



New Hob  
Tolerance Chart  
—write for a copy.



# STANDARD TOOL Co.

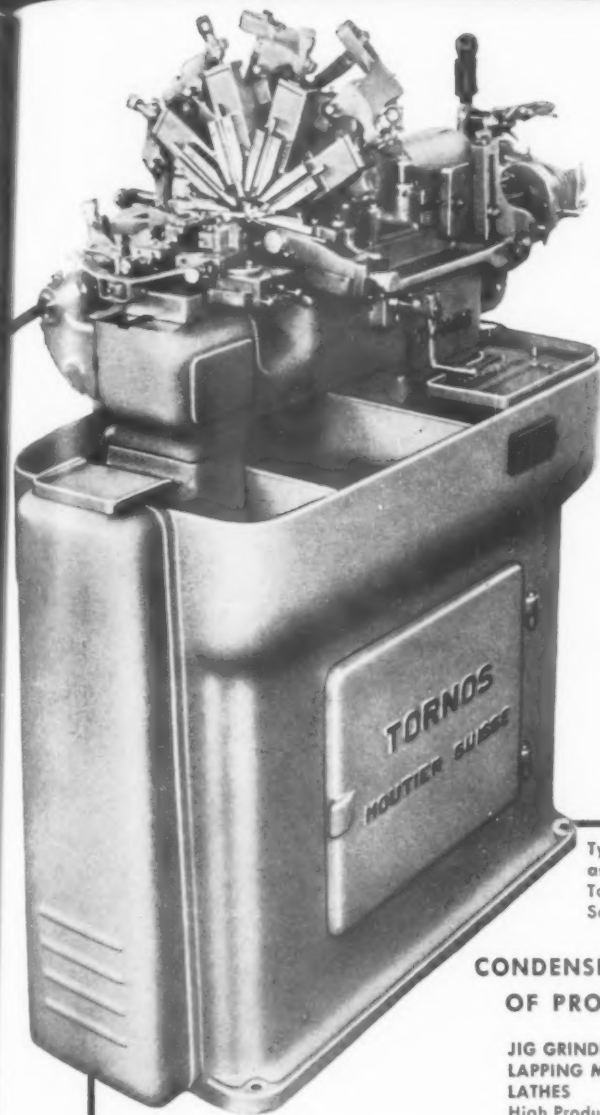
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**New York • Detroit • Chicago • Dallas • San Francisco**

**THE STANDARD LINE: Twist Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Nobs • Counterbores • Special Tools**



## SWISS BLUE RIBBON PRECISION MACHINE TOOLS

*Backed right  
here in the U. S.  
by skilled  
technicians,  
factory service  
and guarantee,  
and spare parts  
readily available  
from every  
Hirschmann  
Branch.*

Typical as to precision and  
as to fame of trade name.  
Tornos R10 Swiss Automatic  
Screw Machine.

### CONDENSED SUMMARY OF PRODUCTS

#### BAND SAW & FILING MACHINES CAM-MAKING EQUIPMENT CHECKING & MEASURING INSTRUMENTS

Horizontal Micrometers • Optical  
Vertical Micrometers

#### CHUCKS

Keyless Drill

#### DIAMOND & OTHER ABRASIVE WHEELS

#### DIE SETS

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#### DRILLING & TAPPING MACHINES

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Precision

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#### GEAR HOBBIING MACHINES

#### GRINDERS

Tool • Twist Drill

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#### INDEX HEADS

Universal

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#### LAPPING MACHINES

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Short Stroke • Copying

#### SPECIAL AUTOMATICS

For Watchmaking and similar industries

#### THREAD CHASING MACHINES

Semi-Automatic

#### THREAD CUTTING MACHINES

Automatic

#### THREAD ROLLING MACHINES

Automatic

#### TOOLS

Screw Machine-Carbide and

High Speed Steel

#### TURNING MACHINES

Semi-Automatic

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Essa  
Hauser  
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Kellenberger  
Kummer  
Lambert  
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Manurhin  
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Nassovia  
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Exclusively Represented  
in the United States by  
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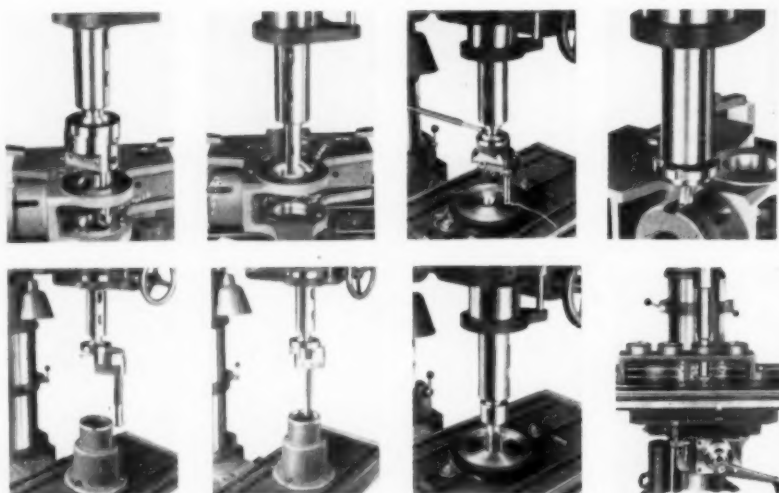
Representatives in Principal Cities



# The Moser Swiss Precision High-Capacity Jig Boring Mill and Multi-Purpose Metal Working Machine with Double Column

backed by 65 years of experience

**Also suitable for:** Drilling and Inside-Diameter  
Turning to Coordinates  
Tapping, Facing  
Threading, Reaming  
Light Milling



The provision of coordinate rules on the cross-slide table, and the thousandth division on the graduated collars, enable drilling and inside-diameter turning to be done to coordinates. Drilling to end blocks: The compound rest slide is equipped with vee-guides for the fitting of end blocks for both directions, i.e. the longitudinal and the transversal movement of the slide. Each guide has an adjustable stop with an indicator.

The double-column-type of construction is extremely solid, sturdy and vibrationless. The simple design both of the gearing and of the power feed provision enables the machine to be operated even by unskilled labour.

Only selected ball and roller bearings are used. Notwithstanding the very great depth of throat, extremely high precision is achieved in all work normally performed on the machine.

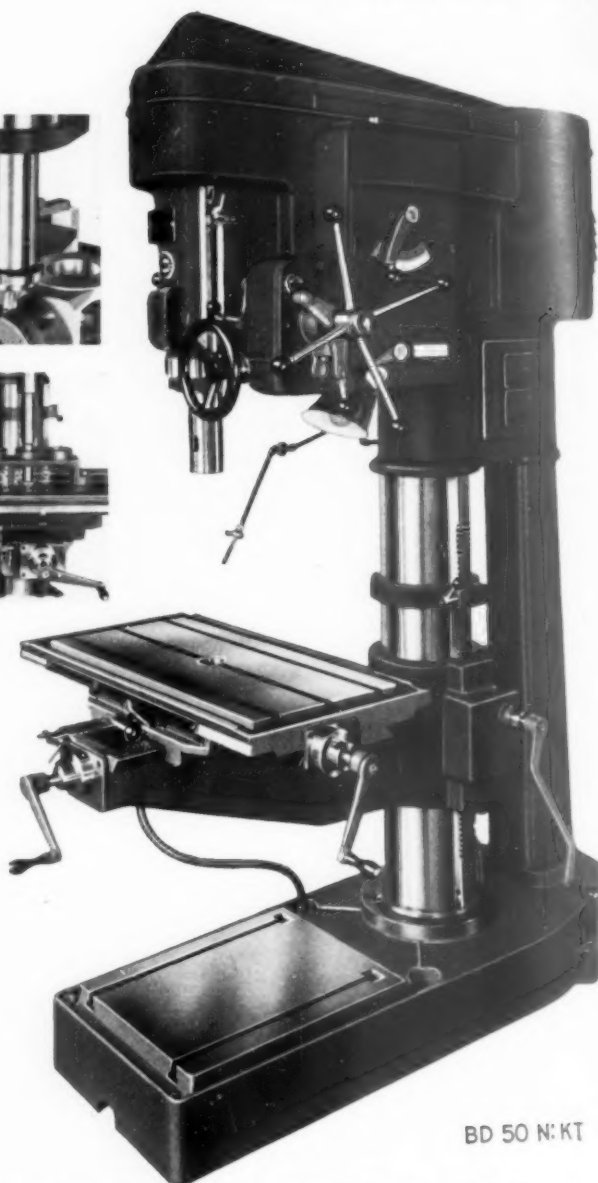
The drilling spindle is mounted on easily-adjustable roller bearings with specially improved true-running provision.

Additional high-step radial bearings are provided to prevent vibration and warping of the drilling spindle, this condition being absolutely essential in drilling, boring and milling work of all kinds. The reversing switch likewise incorporated controls the advance and return strokes of the drilling spindle, thus enabling large screw-threads to be cut.

A special feature is that, awkward workpieces which can only be chucked with difficulty—or not at all—on lathes, can be internally diametred on this machine, thanks to the low workspindle feeds and the thoughtfully graded r.p.m. speeds.

Spares, if they should be needed after many years' service, can be promptly supplied.

Only top-grade switchgear, readily withstanding 40 to 60 switching operations per hour, are used.



BD 50 N:KT

Tool wear is substantially diminished by the great rigidity and vibrationless running of the machine.

**EARLY DELIVERY** (2 to 3 months) and reasonable prices of these SWISS Precision Machines.

Guaranteed drilling capacity in steel in continuous operation	2"
Drilling depth	9"
Diameter of spindle sleeve	4 3/4"
Horizontal depth of throat (column to spindle center)	20"
Maximum clearance between spindle and table	27 1/4"
Maximum clearance between spindle and base plate	45 1/4"
Clamping area of work table (without coolant gutters)	31 1/2" x 133 3/4"

Clamping area of base plate	21 3/4" x 173 3/4"
Lengthwise adjustment of work table (cross slide)	20"
Range of table movement towards column (KT)	
cross slide table	16.73"
Spindle center taper	Morse Nr. 5
Range of 12 spindle speeds from	27—1150 r.p.m.
Automatic feeds per rotation 4:	from 0.002362 to 0.016929"
Net weight of machine	3310 lbs.
Spare-Parts immediately available.	

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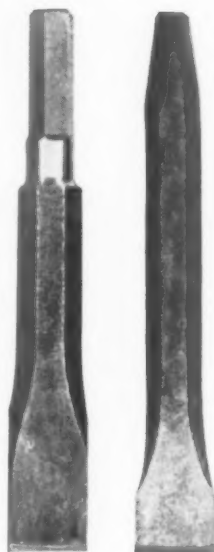
# Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

The Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



## Which chisel has the better design?



Both these chisels, used in pneumatic chipping hammers, are made from shock-resisting tool steel (Bethlehem Omega). One of them consistently gives long service life, while the other is subject to breakage—due directly to its design.

Can you pick out the better design? Look at them carefully. It's the one on the right with the tapered shank.

You still see a lot of chisels designed like the one at the left, that's so susceptible to breakage. Even with the fillet between the round and octagon sections, this chisel is subject to fatigue-failures at the change of section. Stresses become concentrated there, causing premature fractures.

Shank failures are virtually unknown in chisels of the improved, tapered-shank design. The gradual taper prevents any dangerous concentration of stresses.

The comparison of these two chisels helps to explain why it takes more than just good tool steel to get the best performance out of tools and dies. It takes good tool design . . . correct heat-treatment . . . the right grinding technique . . . and proper application. But of course it takes the right grade of good tool steel, too!



**TOOLMAKER AT WORK**—As this progressive die nears completion, the toolmaker checks dimensions carefully. The die is used to blank, punch and form lawnmower parts from 3/16-in. steel strip. It is made from Lehigh H, a high-carbon, high-chromium grade, and hardened to Rockwell C 60. When placed in service the die turned out about 30,000 pieces between grinds, operating in a 200-ton press.

## Omega halts coupling breakage

Omega tool steel plays a vital role in the drilling of blast holes at the Scrub Oaks and Oxford Mines in the historic iron ore belt of Northern New Jersey. In drilling holes from 35 to 125 ft deep, rods of 1-in. hollow drill steel are joined by patented couplings developed by Ralph Catanzarita, drill-steel-shop foreman at Scrub Oaks mine.

When this method of drilling long holes was first tried, the frequent breakage of couplings was discouraging. Our salesman learned of the trouble and sold them on Omega. This shock-resisting grade did the trick. Coupling failures were reduced to about 1 in 500; and there hasn't been one case of stripped threads.

Omega is outstanding for chisels, and it does a swell job on other cold-shock tools: knockout pins, pawls, punches, swaging dies, clutch pins, shear blades, drive shafts, and machine parts subject

to slam-bang shocks. Omega is a tool steel engineered to take the heaviest shocks in its stride. Its typical analysis:

C	Mn	Si	Mo	Va
.60	.70	1.85	.50	.25



It takes a really tough tool steel to take the shock and stress involved in coupling together rods of rock-drill steel. The coupling at left is unused. The one at the right has been used in drilling 1700 ft. of blast hole in hard iron ore. The outside wearing surfaces have been worn down by the abrasive rock.

## BETHLEHEM TOOL STEEL ENGINEER SAYS:



*Air-hardening steels should be quenched uniformly*

What are the advantages of uniform quenching? First, a minimum of dimensional change or distortion; and second, a minimum of undesirable residual quenching stresses.

Here are some helpful points to remember when quenching air-hardening steels:

- Place the tool on a coarse-mesh screen to permit circulation of air on all sides of the tool.
- Turn over the tool at intervals to improve cooling-uniformity.
- Use a fan or a blast of dry air over the sections which cool most slowly. (Caution: Too much air will cause additional non-uniformity.)
- Sections of the tool which cool too rapidly can be wrapped in wire mesh to retard cooling.
- If one portion of the tool turns black long before other portions, you can be sure that it's not cooling uniformly.

WHAT'S  
THE BEST WAY  
TO STRIP PAINT  
FROM METAL PARTS  
TOO LARGE TO BE  
SOAKED IN TANKS?

See Page 3

how to  
**STRIP  
PAINT**

with Oakite  
Materials & Methods

**Oakite's  
New FREE Booklet  
on Paint Stripping**

answers many questions that will lead you to better stripping procedures. You'll want to read more about:

What's the best way to strip large areas of structural metal where a steam supply is available? *See page 5.*

What is the best method when steam is not available? *See page 7.*

What is the cheapest way to strip metal parts in large volume? *See page 9.*

What are the best ways to prepare stripped surfaces for repainting? *See page 11.*

What strippers are best for removing oil-base paints? . . . Synthetic enamels, alkali-resistant plastics or resin-based paints? . . . Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas? *See page 12.*

**FREE** For a copy of "How to STRIP PAINT" write to Oakite Products, Inc., 58 Rector St., New York 6, N. Y.

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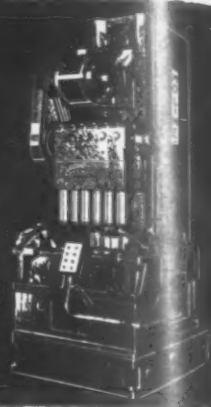
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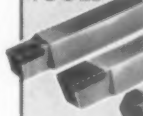
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BAR STOCK



TOOLS

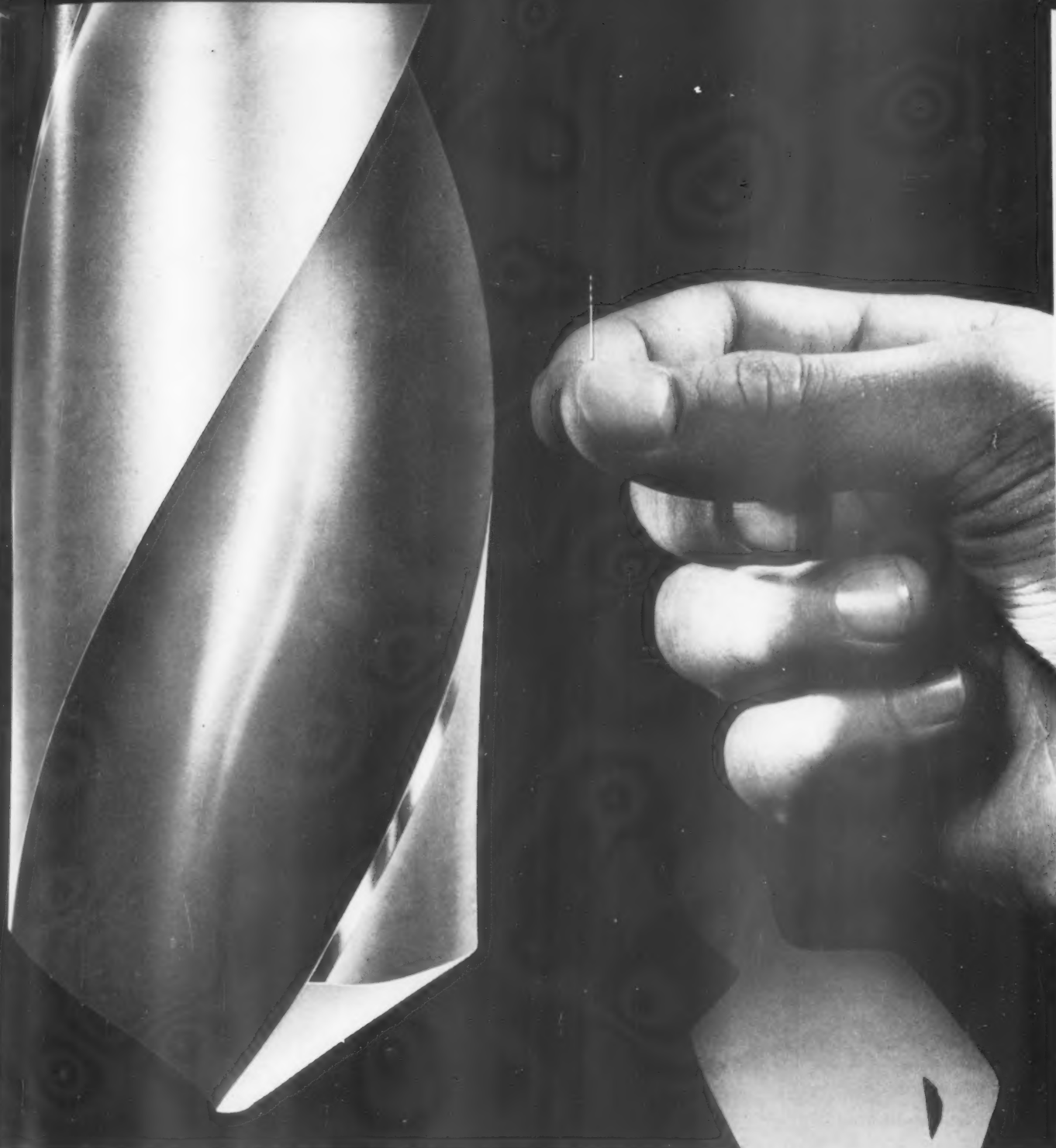


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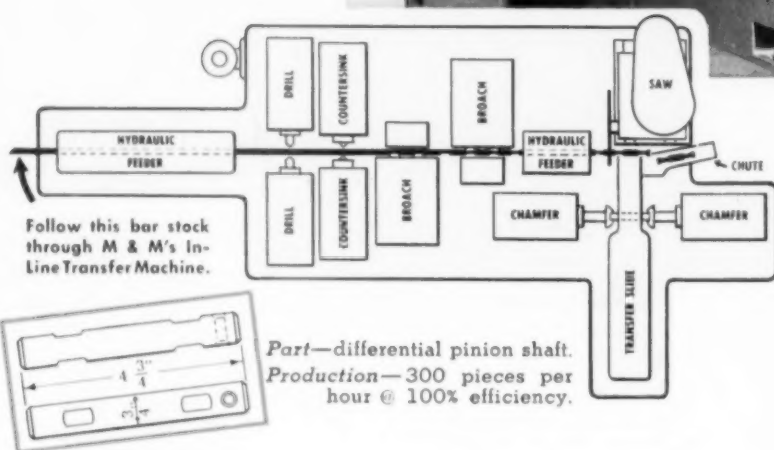
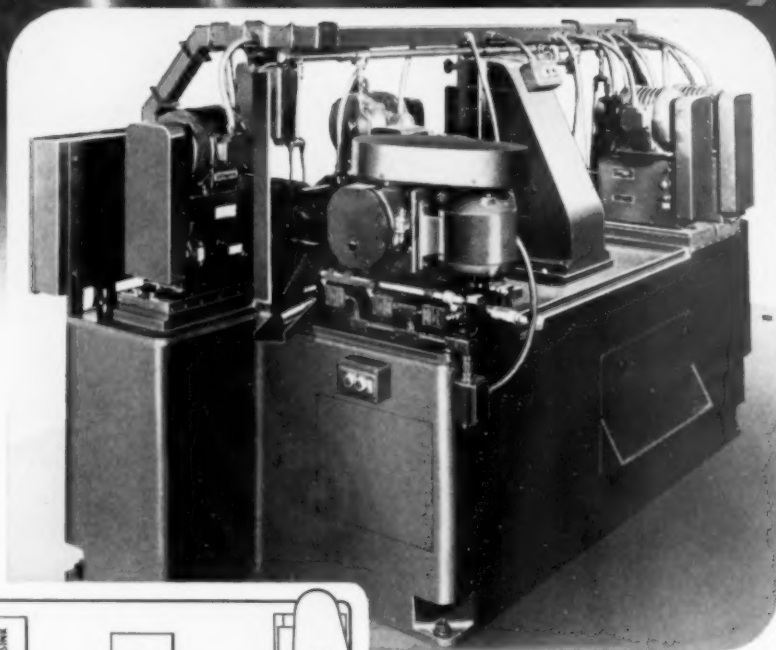
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Motch & Merryweather's forward-looking design *unitizes* a number of operations in the same machine. You obtain maximum usable production per square foot of floor space. Furthermore, you effect the greatest possible savings in time, overhead and operating costs.

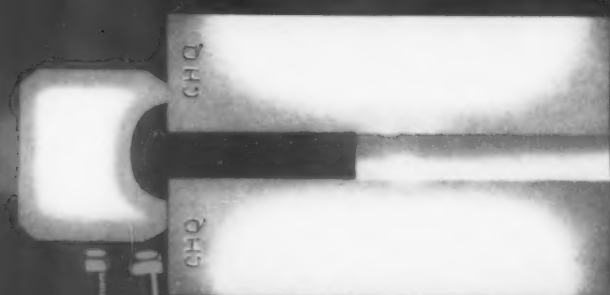
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*die life counts*



*one steel ...*

**CHQ** *for heading dies*



R 270

ONE STEEL—CHQ—is all you need for all cold heading die jobs. Firth Sterling controls the analysis and hardenability of CHQ by size. Therefore, CHQ provides a practical, economical method of increasing header die life and reducing inventories.

**Here is how:**

- 1. Carbon content controlled by size.**
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- 4. Eleven steps of quality inspection.**
- 5. 100% inspection on each bar.**

Firth Sterling's years of experience in the application of Carbide and Steel to the Cold Heading industry is additional assurance that CHQ will consistently do the job on your Cold Heading applications. You can be certain that CHQ is *truly* Cold Heading Quality.



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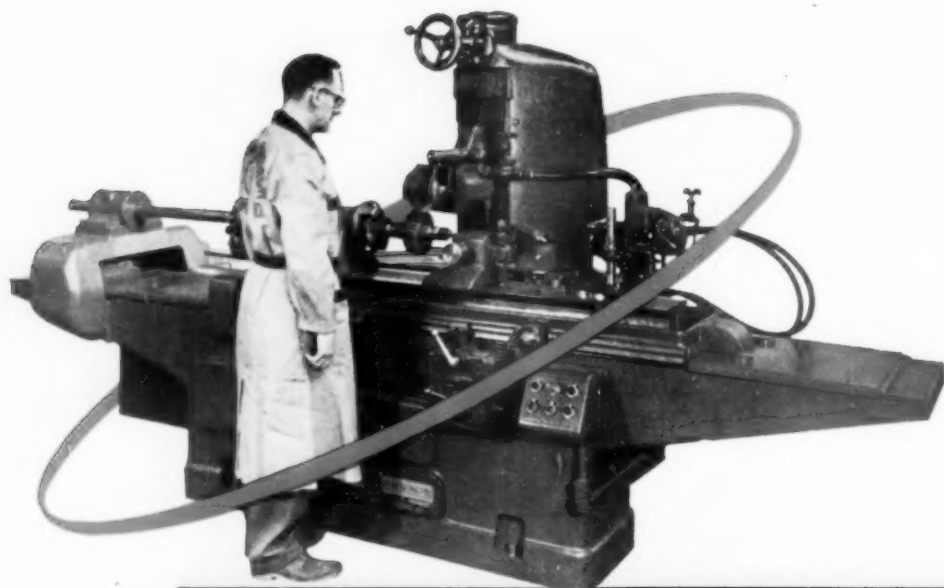
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GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

December, 1952

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173



Indexing mechanism  
of the Helical Grinder



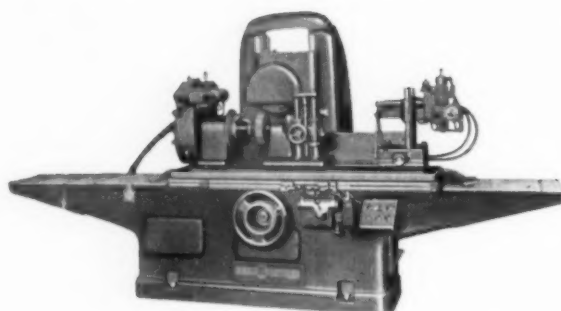
## NEW HELICAL GEAR AND SPLINE GRINDER

*Assures Highest Accuracy  
in both Lead and Tooth Form*

The new Red Ring Helical Gear and Spline Grinder, Models SGF-12" and 18", incorporate the lead bar principle thus eliminating the inherent errors, human and mechanical, of conventional methods heretofore used to maintain specific lead or helix angle.

The lead of every gear tooth or spline is exactly alike—exactly the same as that of the precision ground master lead bar which rigidly controls the progressive rotation of the work part as it is traversed under the grinding wheel.

The grinding wheel is dressed to any desired tooth form. That form is controlled by a hardened steel master form plate which guides the movement of the dresser diamonds.



Red Ring Spur Gear and Spline Grinder,  
Models SGD-12" and SGC-18"

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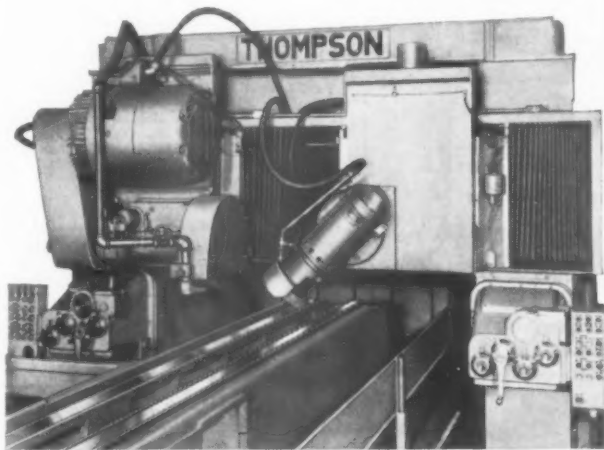
WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

# New Thompson Way Grinder Developments

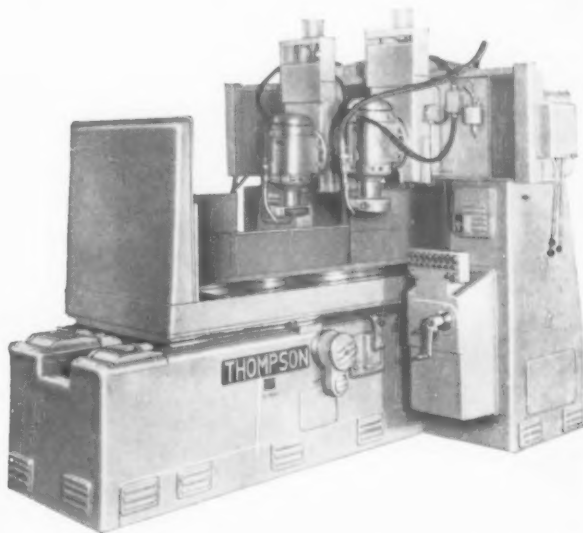
## Reduce Costs ... Speed Machine Tool Production

Way Grinders now available with single, multiple heads, or combinations of horizontal and vertical heads and in sizes to meet all requirements.

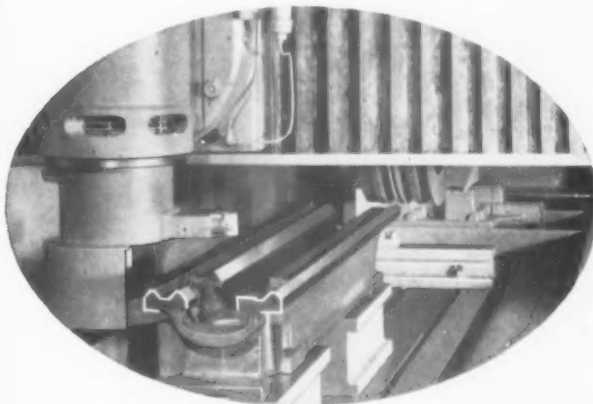
Thompson has produced machine tool way grinders in many types and sizes that have eliminated hand-work and produced economical and accurate ground ways. However, recently increased production grinding of ways has been made possible by many new Thompson Way grinding developments such as: automatic grinding and truing cycles; dual vertical or horizontal heads for grinding ways different heights; horizontal multi-wheel grinding and vertical side and undercutting head; Hydrail way grinding for giant columns or bed ways. Three of the new Thompson Way Grinders are shown here.



Designed especially for extremely large machine tool way grinding is this typical Thompson Hydrail Way Grinder. Size 48" x 48" x 192". Part: grinder bed ways.



One of several new Thompson Double Head Dove-tail Way Grinders installed to speed work and hold accuracy in the plant of a leading lathe manufacturer.



Multi-wheel grinding with auxiliary vertical head. Equipped with horizontal spindle having dual spaced wheels and auxiliary inclinable spindle. The front contoured grinding wheel grinds the rear set of ways and the rear grinding wheel grinds the front set, with vertical head grinding the sides and undersurface of the ways and rack seat.

Write for details Today.

The Thompson Grinder Company, Springfield, Ohio

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**Thompson**  
SURFACE  
**Grinders**



# Mark Twain!

## Mississippi Pilots Use Marking Devices

Samuel Clemens adopted his pen name from the expression used by Mississippi River Pilots, such as he, indicating the 2 Fathom Marking Device affixed to their lead lines.



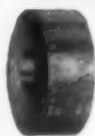
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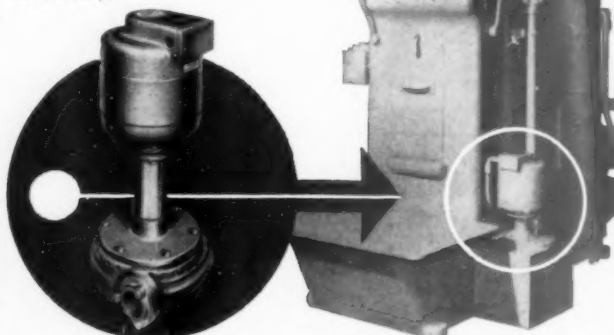
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The American Broaching Machine illustrated is equipped with a 1/2 HP Gusher Coolant Pump.



Courtesy American Broach & Machine Co.

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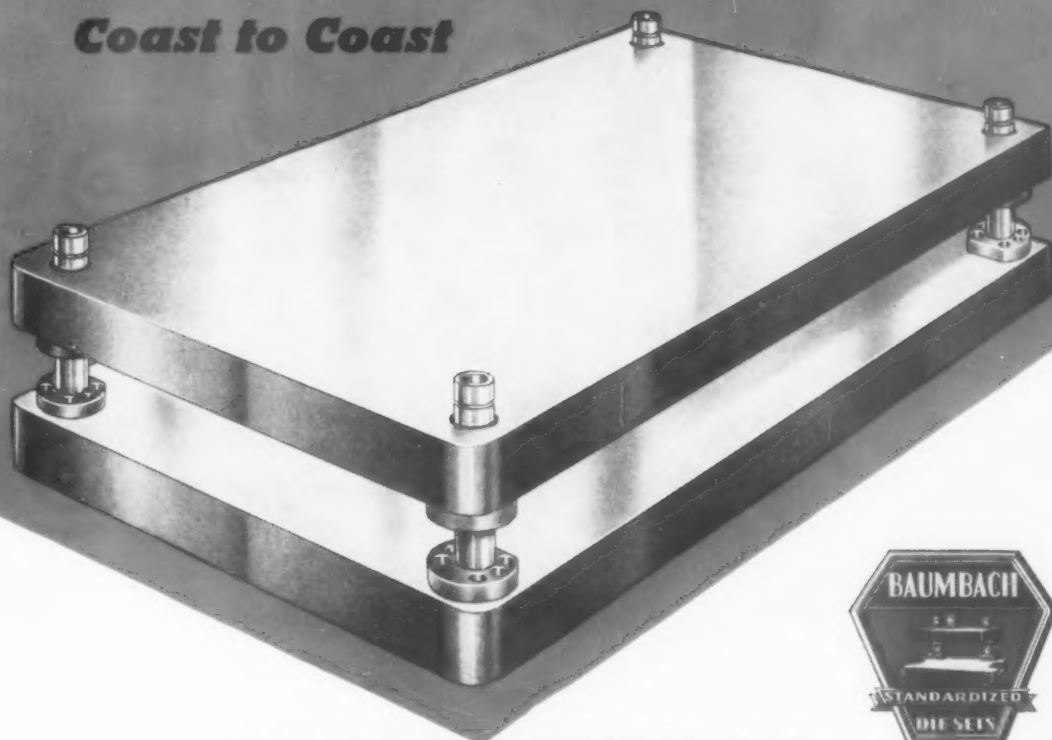
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# **JOE STALIN:** **LAY OFF!**



Seems like every time we pick up a newspaper, you're claiming credit for someone else's inventions. So, for the record—here's a list of 21 Gisholt Turret Lathe "firsts" that date back as far as

1889. Practically all of 'em are standard on good turret lathes today. And every one of these was "invented" right here in Madison, Wisconsin, U.S.A. So don't try to claim that you "did it first."

1. First heavy turret lathe for chucking work.

2. First geared headstock on turret lathe—provided three speed changes without shifting belts on cone pulleys.

3. First turret lathe with independent power feed cross slide carriage.

4. First saddle type turret.

5. First multiple tooling of chucking work with combination facing and turning heads and pilot arbor support for added accuracy and rigidity.

6. First chucking turret lathe equipped for thread chasing with lead screw.

7. First headstock cast integral with bed.

8. First turret lathe with power feed for cross slide.

9. First cross feeding hexagon turret.

10. First power rapid traverse for hexagon turret carriage.

11. First turret lathe with built-in individual motor drive.

12. First power rapid traverse for cross slide carriage.

13. First taper attachment for cross sliding hexagon turret.

14. First use of automatic force feed lubrication on a turret lathe.

15. First automatic spindle brake.

16. First quick indexing and automatic clamping of square turret on cross slide.

17. First turret lathe aprons fully enclosed and run in oil bath.

18. First use of antifriction bearings throughout entire machine.

19. First rapid traverse for cross slide.

20. First turret lathe with hardened steel ways.

21. First automatic pressure lubrication of ways.

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**MACHINE COMPANY**

**Madison 10 Wisconsin**

**THE GISHOLT ROUND TABLE** represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



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We like this enviable position. Thus, we make sure our research and development keeps step with industry's need for new, improved tool steels. You, too, can profit from our long experience by taking advantage of our metallurgical service. You are assured of prompt delivery of your requirements from our fully-stocked warehouses, strategically-located throughout the country.

**SEND TODAY** for the unique Crucible Tool Steel Selector—a twist of the dial gives the tool steel for your application.

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Airdi® 150  
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BY  
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9" diameter,  
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first name in special purpose steels

## TOOL STEELS

52 years of *Fine* steelmaking

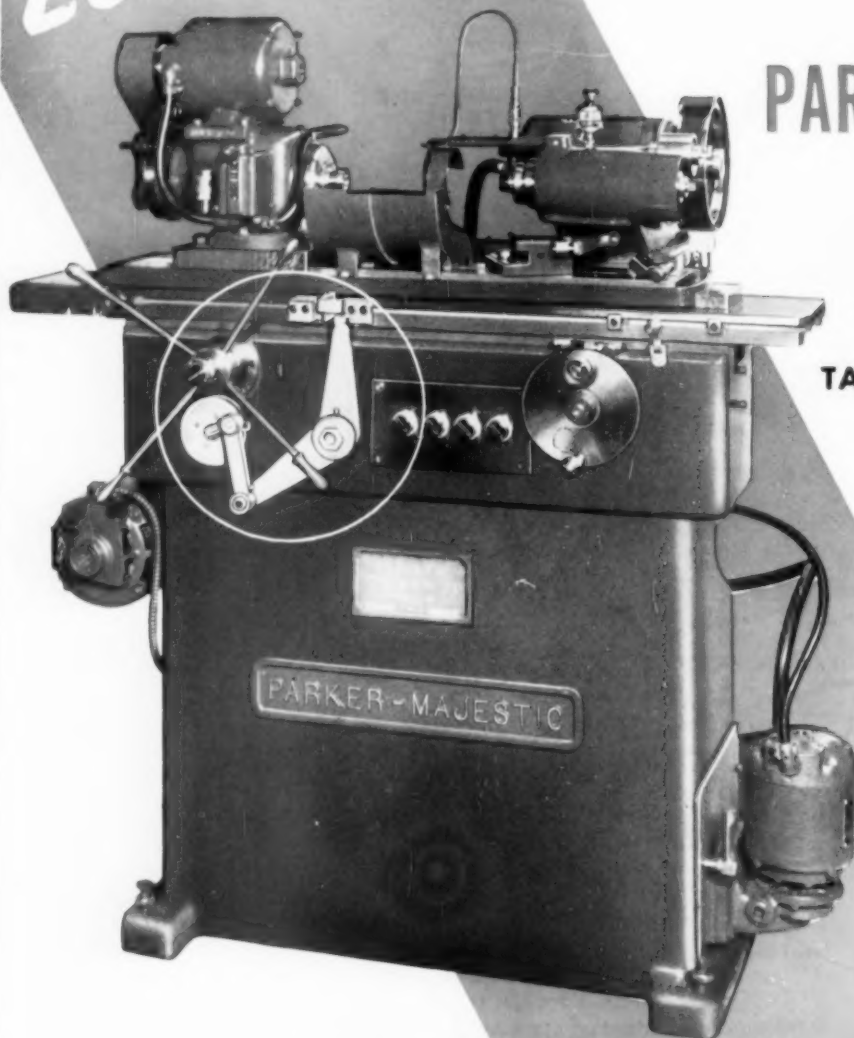
CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

**FOR  
ECONOMY**

PRECISION MACHINES



PARKER • MAJESTIC



## PARKER-MAJESTIC GRINDERS

WITH THE ADJUSTABLE  
TABLE RECIPROCATING  
MECHANISM\*

*Give  
Smoother  
Performance*  
**AND GREATER  
ACCURACY**

### **OUTSTANDING FEATURES**

1. Positive Mechanical Operation.
2. Reciprocating Table travel adjustable from 0" to 3".
3. Rapid and accurate table movement.
4. Four table speeds—15, 30, 45 & 60 reversals per minute.

\*Optional equipment with most models of Parker-Majestic Internal or External Grinders.

**PARKER-MAJESTIC, INC.**

formerly

**Majestic Tool & Mfg. Co.**

147 JOS. CAMPAU

DETROIT 7, MICHIGAN



## PRODUCTIONEERED

for higher production,  
greater efficiency

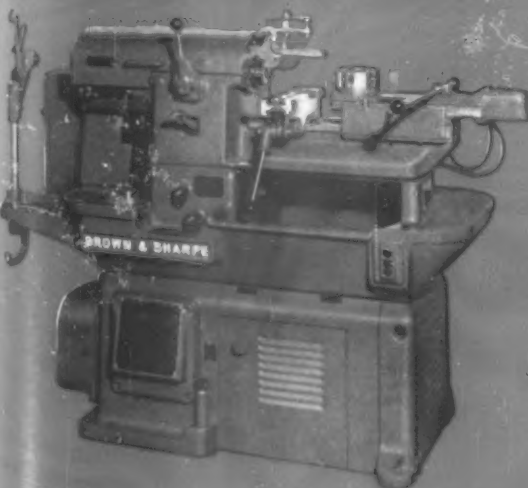


### AUTOMATIC SCREW MACHINES

Uniformly rapid non-cutting movements combined with high cutting efficiency make these Brown & Sharpe Automatics consistently high producers. No. 00G takes stock to  $\frac{3}{8}$ " dia., No. 0G to  $\frac{1}{2}$ " dia., No. 2G to 1" or  $1\frac{1}{2}$ " dia., and new No. 4 to  $1\frac{1}{2}$ " dia. (to  $2\frac{3}{8}$ " dia. where work permits).

## PRODUCTIONEERED

for simpler set-ups,  
smaller-quantity runs



### New HAND SCREW MACHINES

Fast and profitable for small quantity runs of bar work and second operations, these machines use many of the same tools, collets, and fingers as the automatics. Three sizes, Nos. 00, 0, and 2, take stock to  $\frac{3}{8}$ " dia.,  $\frac{1}{2}$ " dia., and 1" dia. respectively.

## PRODUCTIONEERED

for high speed production of  
small screws, pins, bushings



### AUTOMATIC SCREW THREADING MACHINE

Small parts requiring threading, forming, cutting-off, and slotting operations can be produced on this machine at unusually high production rates and minimum unit cost.

## PRODUCTIONEERED

for smooth-end cutting-off  
in a single operation

### AUTOMATIC CUTTING-OFF MACHINE Opposed Spindle Type

Designed to produce form and cut-off work with no tear on the cut-off end. Work is held securely in both work spindle and opposed spindle. Production rates from  $\frac{3}{4}$  second to  $45\frac{1}{2}$  seconds per piece. Takes stock to  $\frac{3}{8}$ " dia.

Write for specifications of these machines or  
information on any other Brown & Sharpe product.  
Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

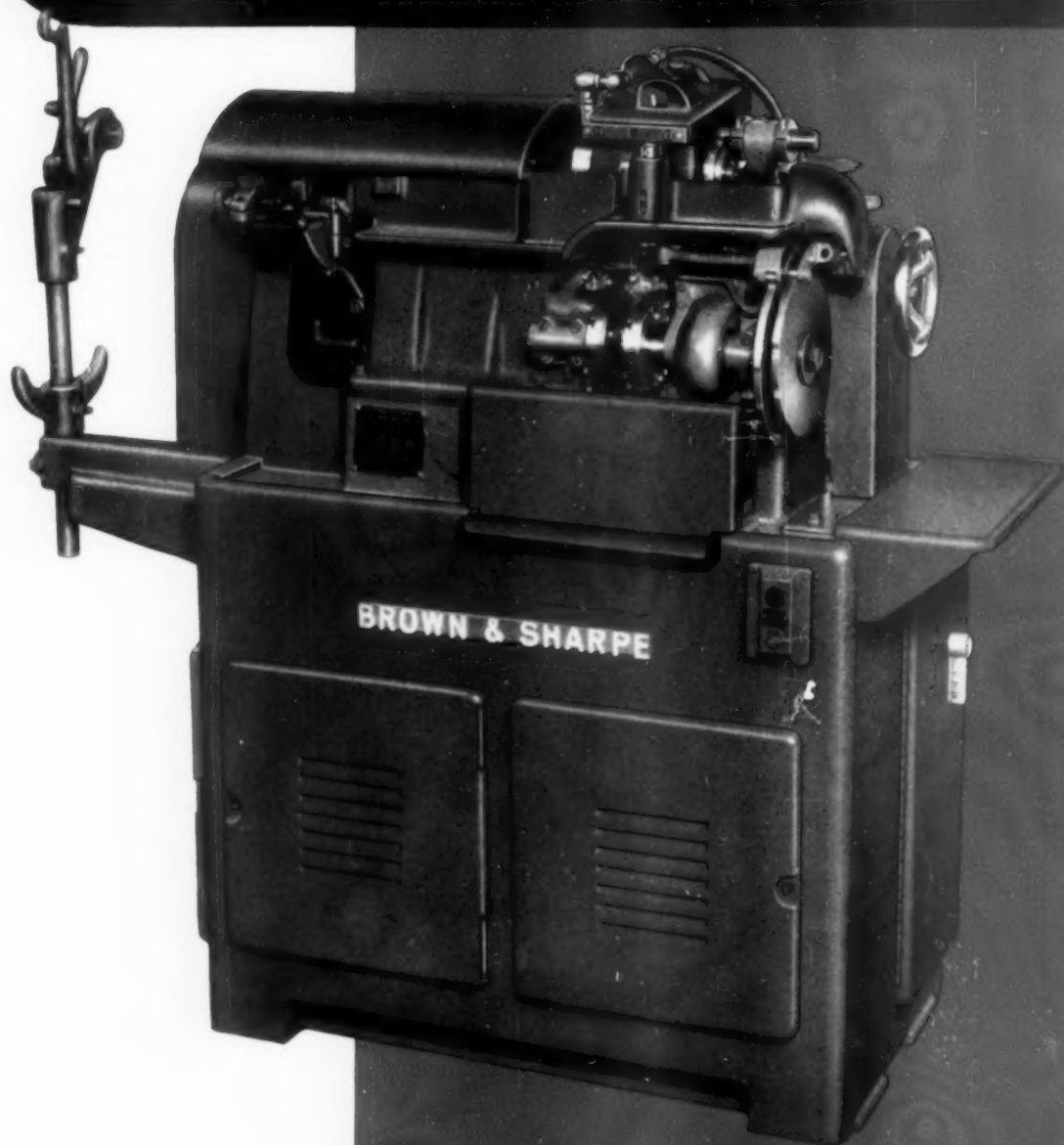
# Brown & Sharpe

Milling Machines • Grinding Machines • Cutters  
Screw Machines • Machine Tool Accessories • Pumps  
Machinists' Tools • Electronic Measuring Equipment  
Johansson Gage Blocks • Permanent Magnet Chucks



# PRODUCTIONEERED

## for Every Screw Machine Department



***Brown & Sharpe***

### AUTOMATIC PINION TURNING MACHINE...

This Brown & Sharpe Automatic is specifically designed for high-level production — "Productioneered" to give you maximum output of close-tolerance, fine-finish, staff and pinion work. It is doubly valuable . . . equips you for volume production and relieves your need for pinion turning specialists. Simple, positive accuracy-protection features include a tool adjusting dial indicator on swing arm, permanent-contour circular-formed single-point tools, and individual micrometer stop on each tool. Takes stock to 1/4" dia. See next page for other Brown & Sharpe "Productioneered" Screw Machines.



# FLUID PRESSURE BOOSTERS

- Save space, weight and investment cost by replacing pump installations in many applications
- Less costly to install, operate and maintain
- Hold pressure indefinitely without the motion and heat generation of ordinary pump circuits
- Provide — at point of cylinder thrust — more efficient power with less weight in less space than direct driven air cylinders
- Save up to 95% of air consumed by direct driven air cylinders
- Operate at speeds of 30 to 450 strokes per minute

Visit Our Booth #1016

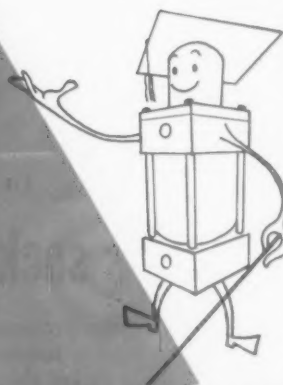
Jan. 1953 Plant Maintenance Show

**BOOST  
30 PSI AIR**

Input Range: 40 to  
3000 psi Air or Fluid

**TO  
2000 PSI  
HYDRAULIC  
PRESSURE**

Output Range: 200 to  
10,000 psi Fluid



**ESPECIALLY RECOMMENDED FOR**

- WELDING
- PUNCHING
- SHEARING
- CLAMPING
- RIVETING
- CRIMPING
- PRESSING

*and similar applications*



FULL DETAILS IN MILLER BULLETIN B-200 SENT FREE ON REQUEST  
Other Miller products include: Air cylinders, 1½" to 20" Bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.



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HOUSTON • TORONTO, CANADA and OTHER AREAS



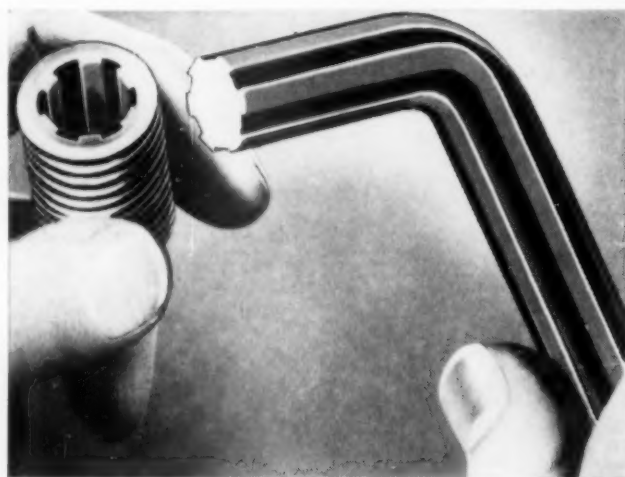
**MILLER MOTOR COMPANY**

2010 N. Hawthorne Ave. • Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS  
COUNTERBALANCE CYLINDERS



## Vibration won't loosen the set



## held tight by this socket

If you need vibration-resistance in your product, whether it's a big cash register or a tiny precision instrument, you need the only screw with the unique socket shown above, Bristol's Multiple-Spline Socket Screw.

When assembled with it, your product holds tight despite vibration because the multiple-spline socket permits tightening beyond limit possible with any other type of screw . . . turns internal wrenching force into *rotary motion*, not expanding pressure. Hence, no bursting, no rounding out of socket walls—even in sizes down to No. 3, 2, 1, 0 wire.

In addition, Bristol's Multiple-Splines are *stronger* than ordinary screws, permit you to use smaller sizes for more compact design. They speed assembly by wrenching easier, especially in hard-to-get-at places. Disassembly is easier, too . . . a reverse flick of the switch starts it and even frequent disassembly won't hurt the socket.

**HEX SOCKET SCREWS, TOO.** Only Bristol gives you the right socket screw for every application. **FREE SAMPLE.** State size and type on your company letterhead. Also write for helpful bulletins on designing compact, tight assemblies.

# BRISTOL'S SOCKET SCREWS

THE BRISTOL COMPANY, Socket Screw Division, Waterbury 20, Conn.

USE READER SERVICE CARD; INDICATE A-12-184-1

GEORGE L.

# Detterbeck Quality Tools

**SPEED UP  
Screw Machine Production**

SELECT  
YOUR NEEDS  
FROM THIS  
LIST.

*We specialize in*

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HIGH SPEED STEEL AND  
CARBIDE FORM TOOLS

SPECIAL CUTTING TOOLS

SPLIT DRILL BUSHINGS

CROSS SLIDE KNURL HOLDERS

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RECESS SWING TOOLS

FORMING SWING TOOLS

Inasmuch as we manufacture cams and tools for the trade we obviously do so on a production basis. As a result we offer:

1. Superior type tools . . . at low cost.
2. Practical design based upon many years of experience.
3. Correct specifications which insure maximum service.

Your tool requirements in our hands is your guarantee of better tools at a great saving.

### PROMPT DELIVERIES

Tool making with us is a routine matter. Special equipment . . . skilled hands . . . plus know how, enables us to fill orders in a minimum of time.

### SERVICE

Let us quote on your tool requirements. You'll save money . . . even as compared with "home made" tools. Standard circular form tools for B&S and Davenport Machines carried in stock. Immediate delivery.

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ENGINEERS TO AN INDUSTRY

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Tool Engineer, Use the Handy

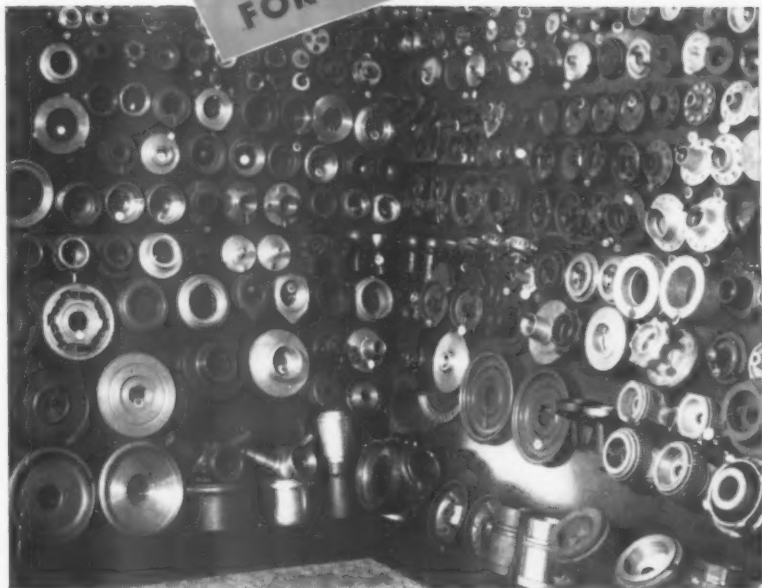
Readers Service Card on

Page 101.



**BULLARD MACHINE TOOLS**

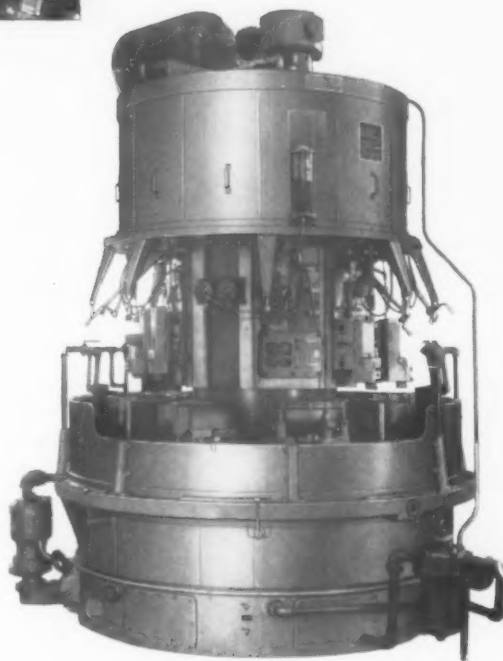
**FOR GREATER MANUFACTURING ECONOMY**



From the time of the inception of the Mult-Au-Matic back in 1914 these machines in customers' plants have probably machined the largest variety of work of any machine tool. Illustrated herewith are only a few of many hundreds of Mult-Au-Matic jobs. The machine's versatility suits it for nearly any type and shape of work where the operations call for boring, turning, facing, drilling, reaming and threading.

Motor manufacturing which includes pleasure cars, trucks, tractors, mechanical farm equipment and airplane engines is the largest user of these automatic multiple spindle machines. However other manufacturers contributing to the mining, shipbuilding, hydro-electric, ore, railroading, oil, bridge construction industries, scientific developments and modern housing projects have found the economy of Mult-Au-Matic production a large factor in the marketing of their products. Wherever automatic multiple spindle manufacturing can be efficiently used there is a place for Mult-Au-Matics with their attendant savings in manufacturing costs. Bullard engineers are ready to assist in applying Mult-Au-Matic efficiency to your particular manufacturing problems. Let us make a study of your production methods.

*For Manufacturing Economy use Mult-Au-Matics. Built in 8-, 12-, 16-, and 34-inch sizes with 4, 6, 8, 12, or 16 spindles according to the specific model.*



**BULLARD**

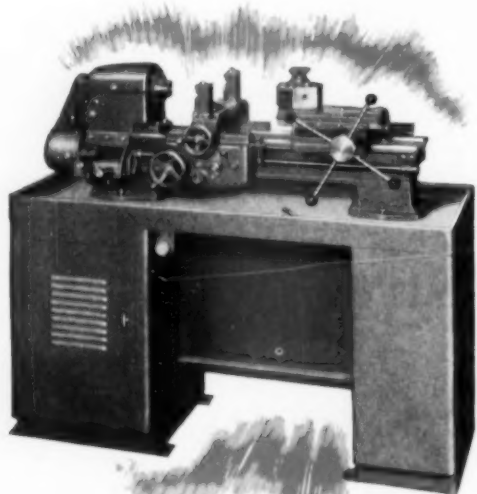
**THE BULLARD COMPANY**

**BRIDGEPORT 2, CONNECTICUT**



"Pop says they're givin' production like his

*Logan* **LATHES!"**



No. 935-2  
**QUICK CHANGE GEAR TURRET LATHE**  
 11" Swing, 1" Collet Capacity,  
 1 3/8" Spindle Hole, 43 3/8" Bed

**METALWORKING PRODUCTION** lines in many industries have found Logan Lathes the key to profitable operation. Set-ups are faster. Power cost is less. The sustained accuracy of the Logan ball bearing spindle holds close tolerances at high speeds. The rugged durability of Logan construction keeps production going at top efficiency and minimum cost per finished part. With their 11" swing, 1" collet capacity and 1 3/8" spindle hole, rugged accurate Logan Lathes are standard tools on many of industry's most efficient production lines. Remember, as you plan for low cost production, no other lathe of comparable specifications can match Logan economy.

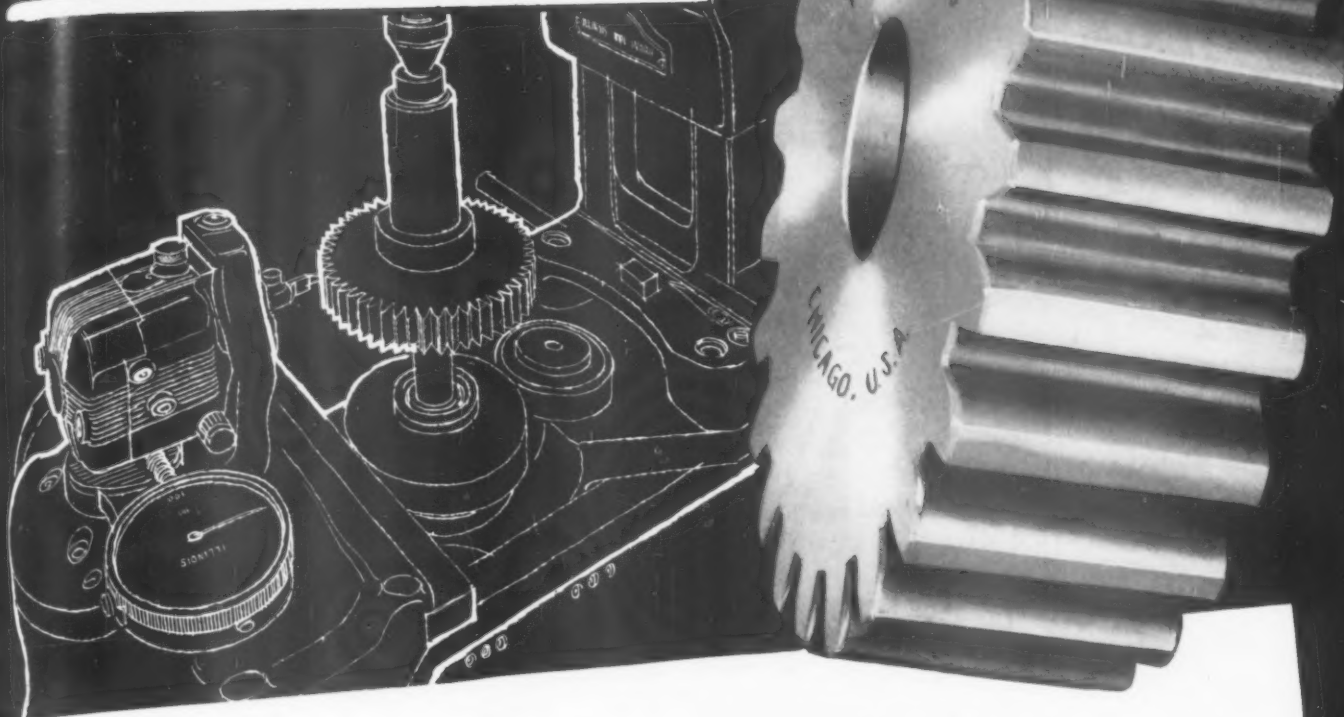
See your Logan Dealer or Write for the Logan Lathe and Shaper Catalog

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

**LOGAN ENGINEERING CO.**

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## ...with ILLINOIS TOOL WORKS MASTER GEARS

Designed by gear specialists and produced by the generating method to assure maximum reliability of checking results, Illinois Tool Works Master Gears give a true picture of production gear performance. They simplify functional gear checking operations, too, because all critical dimensions for checking calculations are clearly marked on each master. You can be sure of gear accuracy... and gear performance... when you check with Illinois Tool Works Master Gears!



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... contains helpful engineering data and illustrations on the function and application of master gears. Reserve your copy now ... it pays to "Know Your Master Gears."

### ILLINOIS TOOL WORKS

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"Headquarters for Engineered Cutting Tools"

# NOW...

# A GREAT



**D-6 Models**—6" x 18" and 6" x 24" sizes. Manual and hydraulic operation—7" wheels.



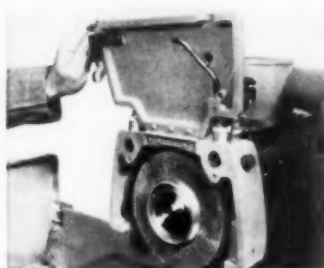
**D-8 Models**—8" x 24" with 10" or 14" wheels. Manual and hydraulic operation.



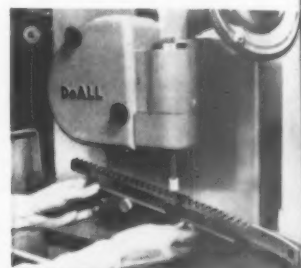
Variable speed wheel dressing feed.



Skip feed for intermittent plunge grinding.



New flood and "Cool-Grinding" system.



High speed spindle, vertical or horizontal.

## ATTACHMENTS and ACCESSORIES

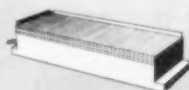
1. **Coolant System**—"Cool-Grind" (coolant through the wheel) or flood grind, or both simultaneously.
2. **Coolants** for every job.
3. **New Laminated-top Magnetic Chuck.**
4. **Magnetic Sine Chuck**—for fast easy setups on single or compound angle work.
5. **Selectron**—for controlling magnetic chuck holding power—and demagnetizing.
6. **High Speed Spindle Attachment Vertical or Horizontal**—provides speeds up to 20,000 RPM, for use of very small wheels.
7. **Variable Spindle Drive**—electronic control provides infinitely variable speeds.
8. **Crush Dresser Spindle Drive**—slow-speed drive for wheel crushing.
9. **Crush Grinding Attachment**—provides steady table speeds down to 1" per minute—includes heavy duty spindle.
10. **Adjustable Crush Roll Idler Stand**—permits tilting of crush rolls.
11. **Motor-Driven Crush Roll**—for forming grinding wheel or crush rolls.
12. **Automatic Downfeed**—can be set to feed at each reversal, or alternate reversals of table.
13. **Automatic Skip Feed**—table travel speeds up between multiple work pieces when plunge grinding.

**CALL DoALL**

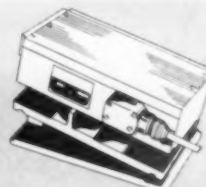
See your Classified Phone Directory for Local Sales-Service Stores



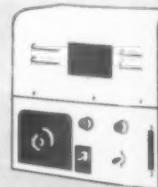
**BAND MACHINES**



**MAGNETIC CHUCK**



**SINE CHUCK**



**SELECTRON**

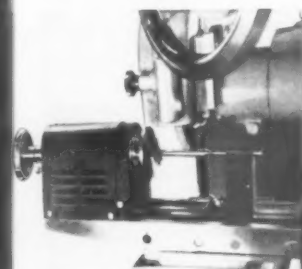


# NEW

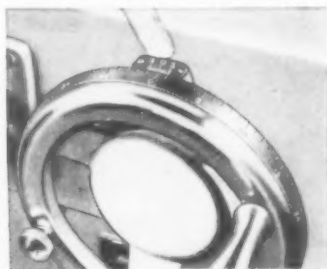
# LINE OF DoALL Precision SURFACE GRINDERS



D-10 Models—10" x 30" chuck with 10" or 14" wheels.



Cylindrical grinding and indexing attachment.



Slip rings for zeroing hand-wheels.

**NEW SIZES**—including 6" x 24" and 10" x 30".

**NEW 12½" WORK HEIGHT CAPACITY.**

**NEW SPEEDS**—up to 100 fpm table travel.

**NEW RECIRCULATING "COOL-GRINDING" SYSTEM.**

**NEW RIGIDITY AND STURDINESS.**

**NEW ATTACHMENTS AND ACCESSORIES.**

**NEW CONVENIENT CONTROLS.**

**NEW FULLY AUTOMATIC OPERATION.**

... and more!

NEW DoALL Surface Grinders will handle an unlimited variety of surface grinding, cylindrical grinding and form grinding jobs with a heretofore unattainable combination of precision and speed.

You have to see them perform to visualize their capabilities. Ask to have a free demonstration in your own plant. Call your local DoALL Sales-Service Store, or write:

**THE DoALL COMPANY**  
254 N. Laurel Ave. Des Plaines, Ill.



## NEW CATALOG

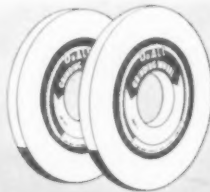
Free. Complete data and description of DoALL Grinder design and construction—coolant systems—controls—automatic setups—attachments. Ask for your copy.



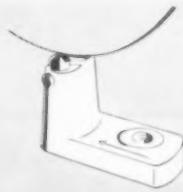
14. Fully Automatic Surface Grinding—controls cross-feed and downfeed automatically.
15. Cylindrical Grinding Attachment—for straight and taper cylindrical grinding and indexing.
16. Dust Collector—for all dry grinding operations.
17. Wheel Dressing Diamonds and Holders.
18. Universal Vise—completely adjustable for holding work in any position.
19. Set of Plain Centers.
20. Wheel Balancing Stand and Arbors.
21. Grinding Wheels.
22. Complete Electrical Panel Remote Control Systems.



COOLANTS



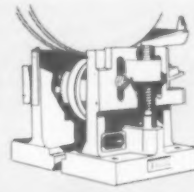
GRINDING WHEELS



DIAMOND DRESSER



DUST COLLECTOR



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GAGE BLOCKS



**Know-don't guess-  
the Hardness of  
your metals---before  
and after machining**

## Ames PORTABLE HARDNESS TESTERS

Show the exact hardness of your metals before and after heat-treating, to reduce tool wear and breakage and to speed up production.

Ames Portable Hardness Testers are light in weight and are carried to the work. Tests are easy to make and accurate, requiring no skill.

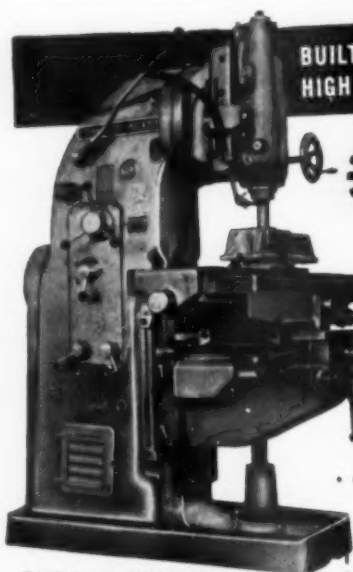
Ames Portable Testers are used to test flats, rounds, strip, tubing, wire, etc., without cutting off specimens. Saws, gears, knives and large irregular shapes are tested while assembled. Readings are direct in the Rockwell Scales.

Send today for interesting folder  
"Rockwell Hardness Testing Made Easy"



**AMES PRECISION MACHINE WORKS**  
Waltham 54, Mass., U.S.A.

USE READER SERVICE CARD; INDICATE A-12-190-1



**BUILT FOR ENDURANCE AND  
HIGH SPEED PRODUCTION!**



## NEW VERTICAL MILLING MACHINE

Model A.V. 3N

**SHORT DELIVERY  
... No Priority Required!**

### PARTIAL SPECIFICATIONS

Table surface	57" x 14"
Table power trav.: Long	39 1/4"
Cross	11"
Vertical	17 1/4"
Vert. trav. of spindle	6 1/8"
Max. dist. spindle to table	19 5/8"
12 spindle spds.: Range	16-650 rpm
9 table power feeds rates, p.m.	
Long. & cross	9 1/2-13 1/4"
Vertical	5/16"-9 5/8"
Quick power trav.: all dir.	37"
Spindle taper, Amer. Stan.	50

**POWERFUL** and rugged, the DIMCO Vertical Miller is precision designed and constructed to give top, economical service. Other fine DIMCO machine tools include engine and turret lathes, grinders, shapers, radial drills, facing lathes, etc. Write us today for complete details!

**KELVIN SYSTEMS  
CORPORATION**  
135 FRONT ST., NEW YORK 5, N.Y.



IMPORTERS OF MACHINE TOOLS  
RADIAL DRILLS • MILLERS  
TURRET LATHES • GRINDERS  
SHAPERS • COPYING LATHES

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## LA-KO TOGGLE CLAMP

**Light Weight • Rugged • Enduring**

**Fills a Big Need—**

**Withstands  
Hard Usage—**

**Economically Priced—**

An outstanding product, made from a stamping, but sturdy enough to stand up under tough usage.



**PIVOT POINTS BUSHED WITH HARDENED STEEL BUSHINGS**

Bushings have a serrated surface, no danger of coming loose. No wear on the body of the clamp; no need for reaming new holes for pins; less waste, scrap eliminated, costs reduced. Pins easily replaced; push out old ones, push in new.

**HANDLE IS DOWN IN LOCKED OR UNLOCKED POSITION**

Accommodates itself to available clamping space; gives clearance above fixture for fast loading and unloading, an exclusive feature. Holding pressure up to 650 pounds. WRITE FOR LITERATURE AND NAME OF DISTRIBUTOR IN YOUR AREA.

## E & E ENGINEERING CO.

14404 Mack Ave. • Detroit 15, Michigan

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**CALL "Reliable" FIRST**

**Nationally Known Brands**

- High Speed
  - High Carbon—High Chrome
  - Oil, Water & Air Hardening
- Below Warehouse Prices.  
Stock List C on request.

**Reliable STEEL COMPANY, INC.**

78 Lockwood Street, Newark 5, New Jersey

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# UNIVERSAL DRILL BUSHINGS

GIVE YOU ALL THESE OUTSTANDING FEATURES



1—super finish reduces wear to a minimum



5—complete variety of sizes and lengths



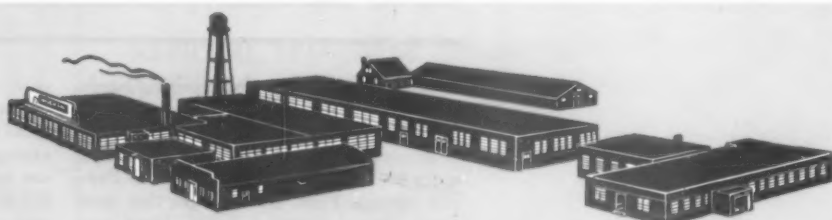
2—blended radius reduces tool hang up



4—knurled head provides quick sure grip



3—100% concentricity and hardness tests assure accuracy



The modern home of finer production tools

**UNIVERSAL ENGINEERING COMPANY**  
Frankenmuth 3, Michigan

165

# Medal of Honor



Private First Class Melvin Brown, of Mahaffey, Pennsylvania—Medal of Honor for valor in action near Kasan, Korea, September 4, 1950. Stubbornly holding an advanced position atop a wall, Pfc. Brown stood off attacking North Koreans until all his rifle ammunition and grenades were gone. When last seen he was still fighting—with only an entrenching shovel for a weapon—rather than give up an inch of ground.

Never forget the devotion of Melvin Brown!

Now, this very day, you can help make safer the land he served so far “above and beyond the call of duty.” Whoever you are, wherever you are, you can begin buying more . . . and more . . . and more United States Defense\* Bonds. For every time you buy a bond you’re helping keep solid and stable and strong the country for which Private Brown gave everything he had.

And remember that *strength* for America can mean *peace* for America—so that boys like Melvin Brown may never have to fight again.

For the sake of Private Melvin Brown and all our servicemen—for your own boy—buy more United States Defense Bonds now. Defense is your job, too!

Remember that when you’re buying bonds for national defense, you’re also building a personal reserve of cash savings. So go to your company’s pay office—now—and sign up to buy Defense Bonds through the Payroll Savings Plan. Don’t forget that now every United States Series E Bond you

own automatically goes on earning interest for 20 years from date of purchase instead of 10 years as before. This means, for example, that a Bond you bought for \$18.75 can return you not just \$25 but as much as \$33.33! For your country’s security, and your own, buy U. S. Defense Bonds now!

***\*U.S. Savings Bonds are Defense Bonds - Buy them regularly!***



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# American Society of Tool Engineers

## Data Sheet Reprint Program

Because of the extraordinary growth of the Society, ASTE members have been receiving only those data sheets of most recent issue. To correct the situation the National Standards Committee has prepared with the help of manufacturers to reproduce as many as possible of the data sheets issued under the Numerical System instituted in 1946. Listed here are those data sheets that have been processed through the reprint program to date.

**Members may at no charge obtain a copy of any of the listed data sheets should they be missing from their binders.**

**A handling charge is made to non-members who may wish copies of these sheets.**

Please indicate by a check mark those required.

<i>Index No.</i>	<i>Company or Organization</i>	<i>No. of Sheets</i>	<i>Index No.</i>	<i>Company or Organization</i>	<i>No. of Sheets</i>
09-54000	Industrial Diamond Association of America, Inc. ....	17	34-91231	Gairing Tool Company .....	1
25-78900	Hardware Products Company .....	1	34-91232	Gairing Tool Company .....	1
25-92000	American Metal Hose Branch of The American Brass Co. ....	3	34-91233	Gairing Tool Company .....	1
25-94310	Bristol Company .....	1	34-93010	Scully-Jones & Company .....	1
31-83112	Bunting Brass & Bronze Company ..	4	34-93012	Scully-Jones & Company .....	1
34-43000	V & O Press Company .....	6	34-93030	Davis Boring Tool Division (Giddings & Lewis Machine Tool Co.) .....	2
34-51181	Lincoln Electric Company .....	1	34-93030	Gairing Tool Company .....	1
34-73134	Gatco Rotary Bushing Company ...	1	34-93064	Scully-Jones & Company .....	1
34-91040	National Twist Drill & Tool Company	6	34-93068	Scully-Jones & Company .....	1
34-91047	Connor Tool and Cutter Company...	3	34-93072	Gairing Tool Company .....	1
34-91048	Gairing Tool Company .....	1	34-93078	Scully-Jones & Company .....	1
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*Automatically Compensate  
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On new machines they reduce the causes of misalignment — on older and worn machines they correct it.

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FAST**

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**"214"**

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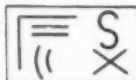
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**CHOICE OF 9 SIZES  
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**From 16 ga. up  
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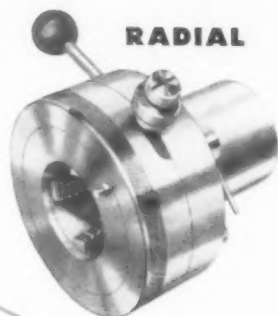
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**The Tool Engineer**

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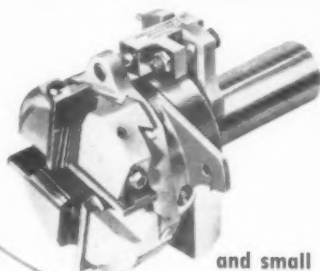
## TANGENT



J & L Tangent Chaser Die Heads, with *ground thread* chasers, are rugged, dependable, time-tested tools. They are production engineered to produce better threads at speeds limited only by the material being threaded. Capacities are from No. 4 to 2".

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and small  
Turret Lathes

For high production, quality threading on B & S Automatics and small turret lathes. Their simple design and careful workmanship assure repetitive accuracy with long runs between chaser grinds.

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DIE HEAD DIVISION



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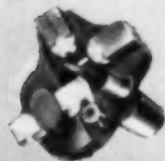
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Most of the Boyar-Schultz Tools were developed because of a known need for improvement...to perform specific, difficult tasks...to eliminate costly "down-time"...or simply to supply the screw machine operator with dependable, long lasting tools that give better than ordinary service.

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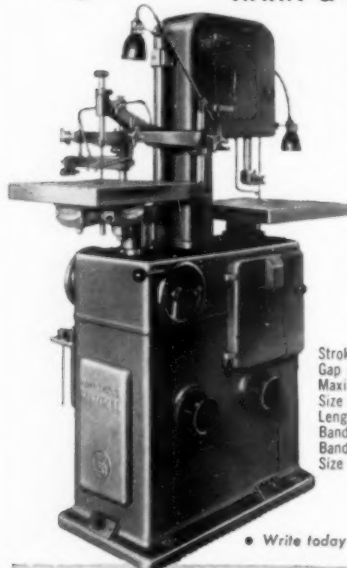
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Maximum thickness of work	3 1/4"
Size of table	15 1/4" x 15 1/4"
Length of files	4", 5", 6", 8", 10"
Bandsaw; depth of gap	1 1/4"
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Size of bandsaw table	19" x 19"

Also available in smaller sizes

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Tools of Today Appearing in this  
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## DANLY SPECIAL DIE SETS

Completed die for blanking a Nash door component—built for longer die life in a Danly all steel 4-post special die set.



Danly all steel 4-post special die set, 14" x 44".

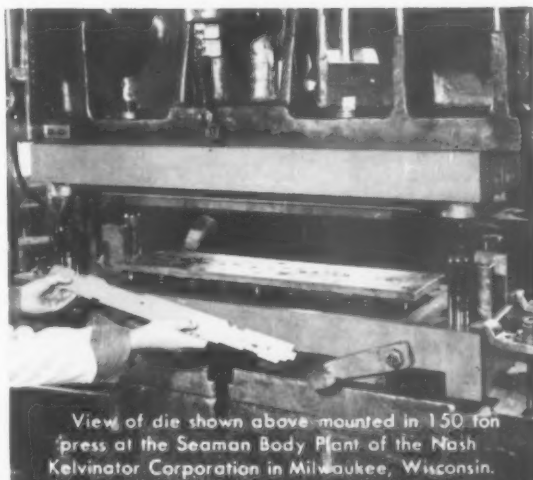
*help Nash meet close production schedules!*

Dies play a big part in modern high-speed automobile production. They have to be ready on time when model changes are scheduled and they have to stand up under three-shift operation day in and day out with a minimum of down time. That's why you'll find so many Nash production dies built in Danly Special Die Sets. A Danly set means fast delivery to meet the tooling schedule and a rugged, precise base for the dies that assures maximum die life.

### DANLY MACHINE SPECIALTIES, INC.

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DANLY SPECIAL DIE SET SERVICE IS FAST AND CONVENIENT  
—CALL YOUR NEAREST DANLY BRANCH



View of die shown above mounted in 150-ton press at the Seaman Body Plant of the Nash Kelvinator Corporation in Milwaukee, Wisconsin.

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DIE SETS . . . STANDARD OR SPECIAL  
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## PIERCE THIS VARIETY OF SHAPES—AND MORE

- *without set up*
- *in sheetmetal or plate*
- *with low cost tooling*

this heavy duty turret punch press increases **QUALITY at LOWER COST**

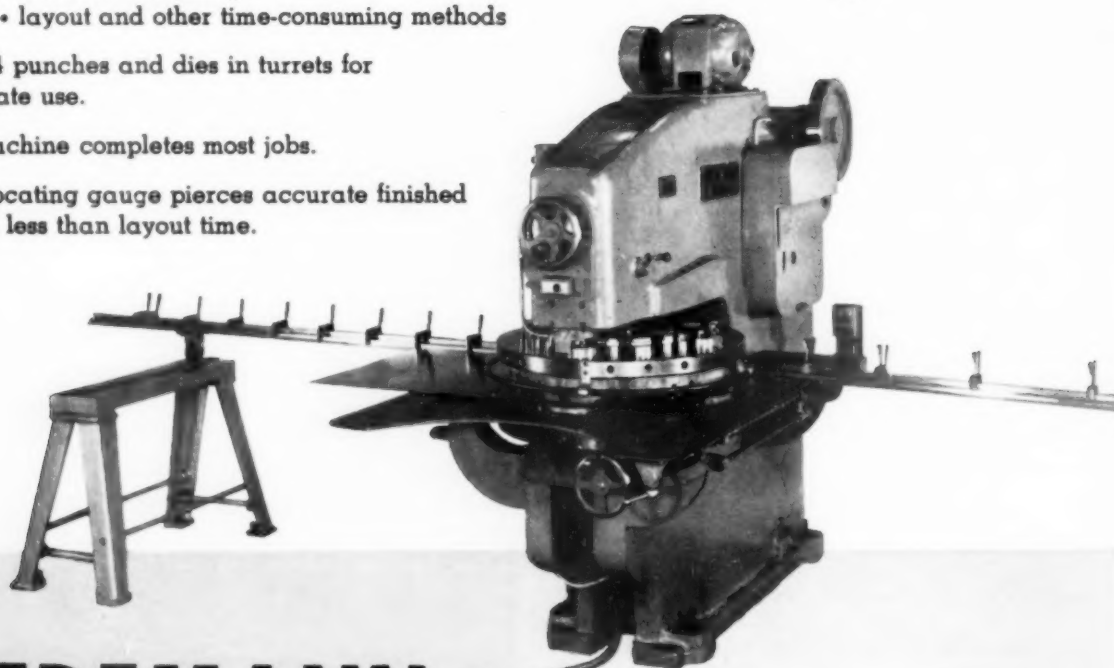
### *Eliminate*

- set up
- excessive handling
- layout and other time-consuming methods

16 to 24 punches and dies in turrets for immediate use.

One machine completes most jobs.

Work locating gauge pierces accurate finished work in less than layout time.



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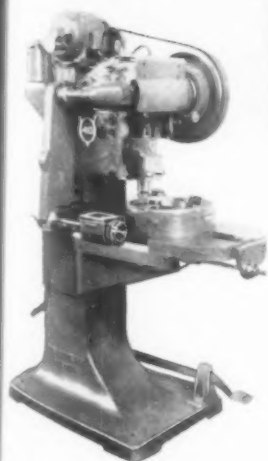
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# ferguson ROLLER GEAR DRIVES

*may speed your machinery up 200% of its original capacity!*



V & O Press Company's  
High Speed Notching Press  
equipped with a Ferguson  
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CUSTOM-ENGINEERED TO MEET  
YOUR EXACT REQUIREMENTS  
RESULT IN:

HIGHER SPEEDS  
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Ferguson Roller Gear Drives deserve your investigation and evaluation. Have your Chief Engineer write for catalog and complete details. Ferguson's designers will gladly help you determine how you may best apply this modern concept of intermittent motion to your own indexing requirements.



18 Roller—10 Stop Drive, 120° Indexing Period.  
Load: 850 Inch-Lbs. Torque @ 160 R. P. M.  
Use: Dial Indexing—Consolidating Machine.



6 Roller—2 Stop Drive, 240° Indexing, 120° D  
Load: 250 Inch-Lbs. Torque @ 160 R. P. M.  
Use: Electric Motor Coil Winders.



2 Roller—40° Oscillating Movement, 90° Rest.  
Movement, 90° Rest, 90° Return.  
Allowed Load: 3150 Inch-Lbs. Torque @ 120 R. P.  
Use: Electric Motor Stator Winders.



6 Roller—3 Stop Drive, 180° Indexing, 180° D  
Load: 1270 Inch-Lbs. Torque @ 160 R. P. M.  
Use: Bottle Crown Assembly Machine—Dial D



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Press.

ROLLER GEAR DIVISION DEPT. D-10  
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FOURTH PLANT  
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WILSON  
"ROCKWELL"  
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Hardness  
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## IT Multiplies TOOL LIFE



Types to fit  
any machine  
used for  
tapping or  
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If you use a Ziegler Tool Holder, you'll get longer service from taps and reamers—for a very simple reason.

When work comes through faulty, the blame is usually placed on the tap or reamer, whereas the trouble often lies in the fact that the work is not properly aligned with the spindle.

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They are terrifically popular because the six staggered cutting edges are scientifically designed to give a shearing cut and thus eliminate all chatter. Made in 12 sizes in all degrees; also supplied as sets in strong Kit-cases.



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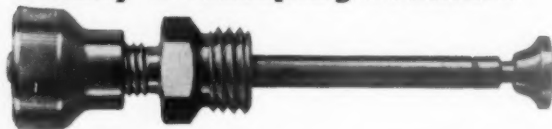
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Swift • Versatile • Economical

- Takes the place of a screw . . . Nothing complicated; no cam action or eccentric pin arrangement to go wrong or wear out.
- To apply, merely weld a standard one-inch nut, or tap a standard one-inch hole to your fixture or clamping area. Screw the pressure unit in.
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- Furnished in 3 lengths: 6", 8" and 10" . . . Also larger lengths if desired.

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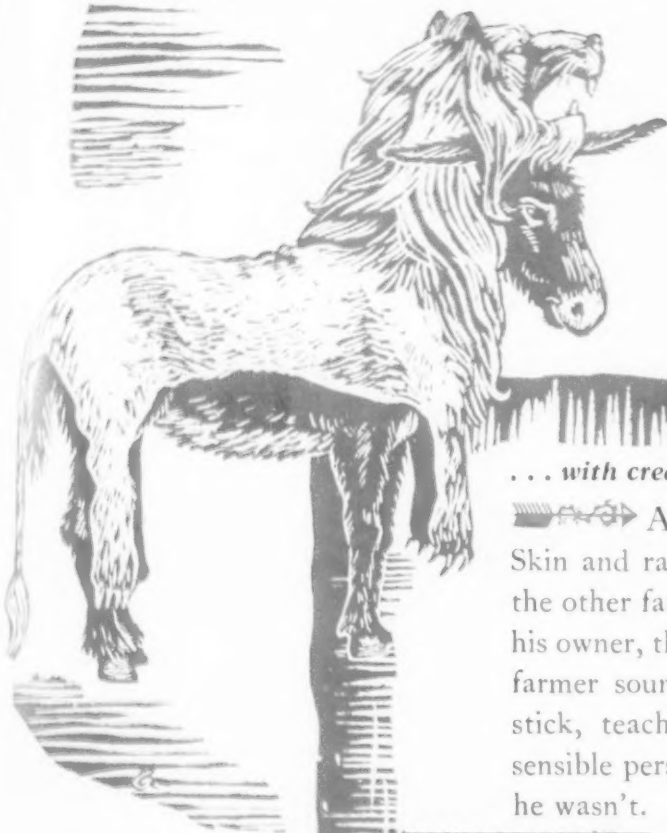
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The Tool Engineer



# "The Ass in the Lion's Skin"

**is a story  
for Cutting Fluid  
users**



... with credit to Aesop, the Fable-Maker

➡ An Ass dressed himself up in a Lion's Skin and ran about scaring the daylights out of the other farm animals. Then he tried to frighten his owner, the farmer. That was his downfall. The farmer soundly beat the stupid ass with a big stick, teaching him that he couldn't fool any sensible person by parading around as something he wasn't.

## **The Moral:**

Different types of cutting fluids have their respective places in machining. Dressing a coolant up in a "Lion's Skin" doesn't change its capabilities. For example, if you have a difficult broaching job on a soft, tough steel *more than a "coolant" is needed*. You need the high *anti-weld* properties, the high *lubricity* and the superior temperature regulating qualities of a

product like Stuart's ThredKut 99.

Stuart offers you a combination of time-tested products and wide experience in their application. You gain from this fewer rejects, longer tool life and greater production—often with *fewer* different cutting fluids in your plant. Ask to have a Stuart Representative demonstrate how he can save you time, money and material.

**More Than a "Coolant" is Needed**

**D.A. Stuart Oil Co.**  
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2727-49 S. Troy St., Chicago 23, Ill.

SEND FOR BOOKLET entitled *More Than a "Coolant" is Needed*

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

to D. A. Stuart Oil Co., Ltd., 2717-49 S. Troy St., Chicago 23, Ill.

Your Name .....

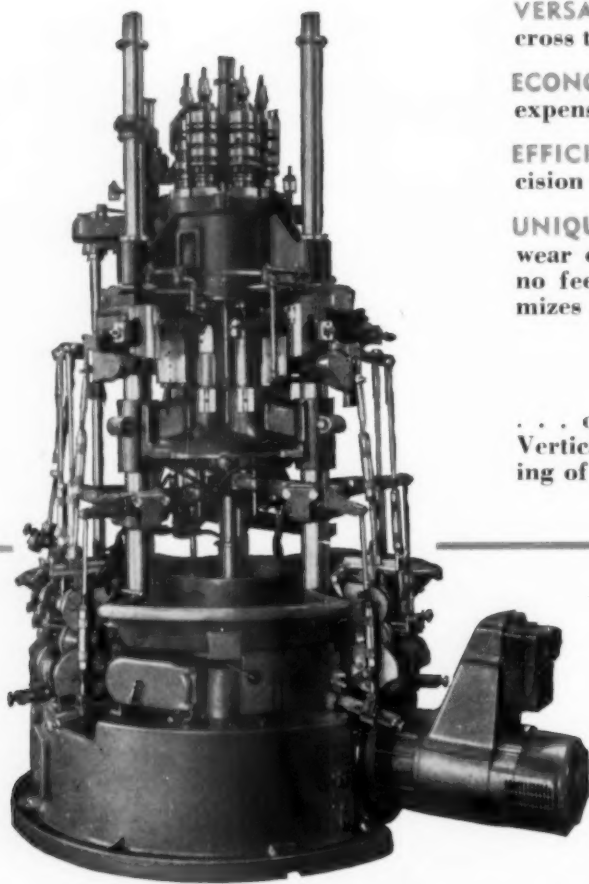
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# GYROMATIC

TAVANNES

THE IMPROVED 6 SPINDLE  
PRECISION

## AUTOMATIC LATHE



GYROMATIC SIX-SPINDLE VERTICAL LATHE

(Shown without bar carrier and oil guards)

**VERSATILE**—SIX rotating end tools and SIX cross tool slides.

**ECONOMICAL**—Both in tooling and set-up expense; uses comparatively little floor space.

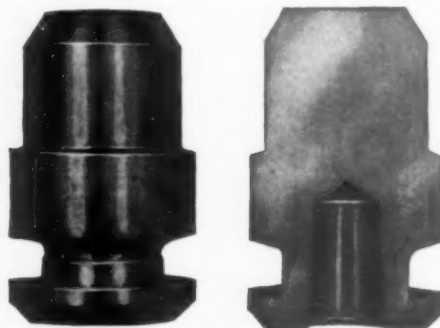
**EFFICIENT**—High production, with built-in precision to meet exacting standards.

**UNIQUE DESIGN**—Vertical arrangement reduces wear of moving parts. Gravity bar feed requires no feed fingers, reduces load on spindles, minimizes vibration and noise.

### CHUCKING OPERATIONS

... can also be performed to great advantage. Vertical design permits easier loading and holding of work pieces.

*Typical work piece taken from bars; capacity of 2 5/8" dia. and 6" long.*



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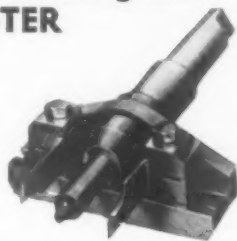
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## Cut Costs on Hole-Cutting with BOREMASTER

Finished holes 1½" to 11¾" diameter to a depth of 8" in one rapid operation on our present equipment with

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The Walker "Concentric Gap" Magnetic Chuck meets day-in, day-out requirements for a powerful chuck. For more than forty years, with a basic electro-magnetic circuit, the Walker "Concentric Gap" Chuck has proven itself reliable, efficient and economical.

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The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

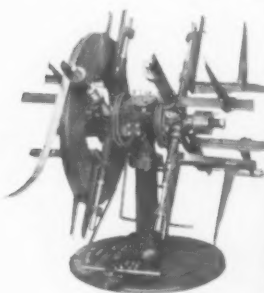
SLEEVES MADE IN FOLLOWING SIZES:  
3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 1"

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AUTOMATIC  
CENTERING  
REELS

Vital minutes are saved, with practically no down time for coil replacement, when a Littell Double Reel uncoils stock to the punch press. The idle side of the reel is loaded while the other side pays out. When a coil is used up, the operator simply lifts the hub lock pin, then swivels the reel 180°, thus placing the reserve coil in press feeding position. The change-over is complete in a few seconds. Like Littell Single Reels, Littell Double Reels combine balance that means smooth running accuracy with rugged malleable iron and steel construction that assures year in, year out dependability.

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No. 3 for coils up to 300 lbs.  
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\*Can be furnished with motor drive

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MACHINE CO.

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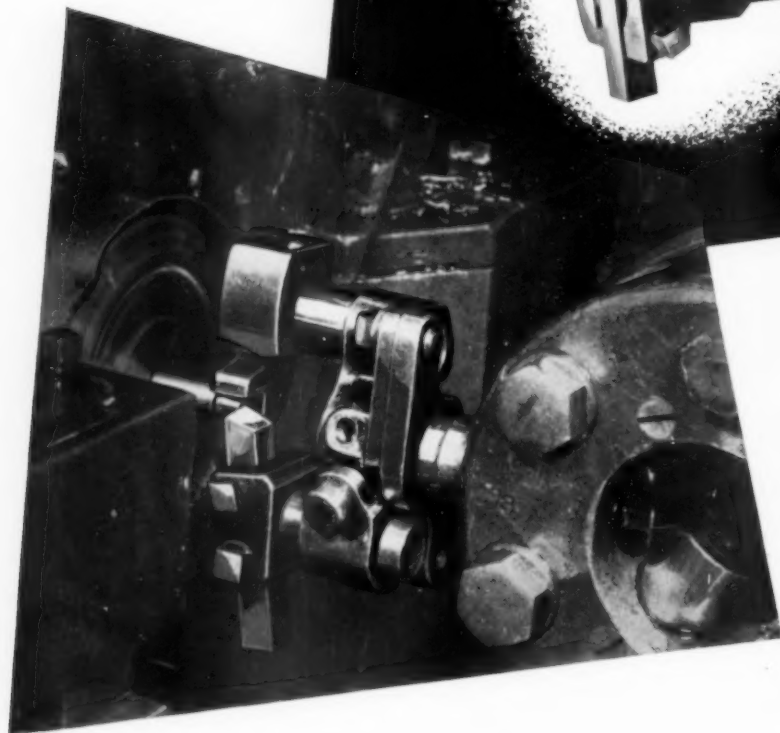
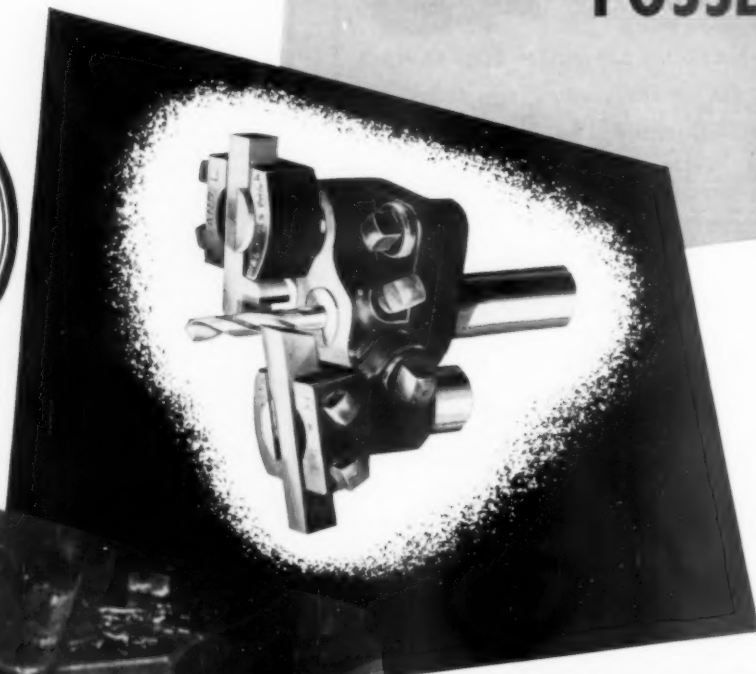
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# R AND L TURNING TOOL

*prized*

POSSESSION

**14**  
TOOLS IN  
**1**



Machinists treasure quality tools! That's why they have created a constant demand for the precision-made R and L Turning Tool.

Besides changing from right to left in ten seconds, the R and L Turning Tool replaces an assortment of fourteen separate tools. It can be used for rough as well as finished cuts, meeting the most difficult job requirements.

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**R and L TOOLS**

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# "Maximum Tool Life... Minimum Down Time... Year in and Year Out"

says  
**E.W. BLISS Co.**  
about



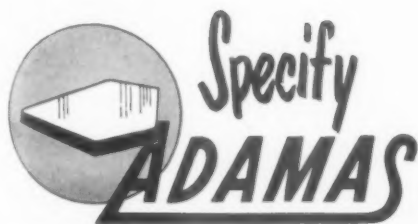
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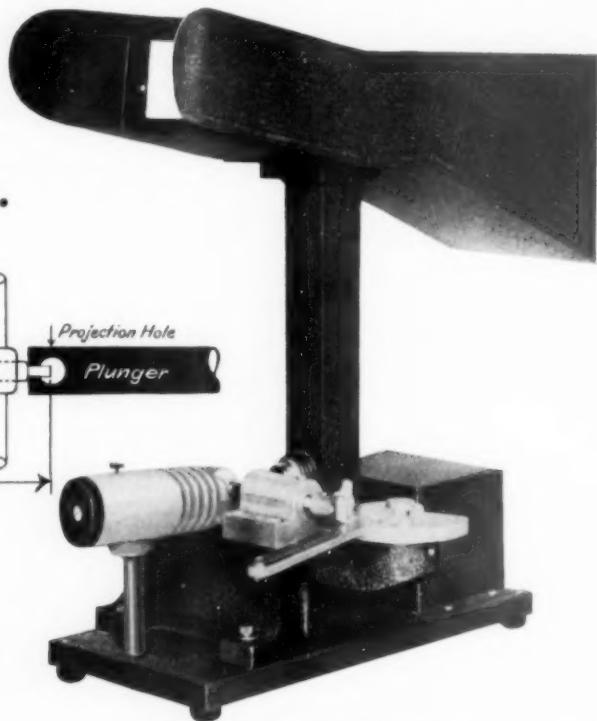
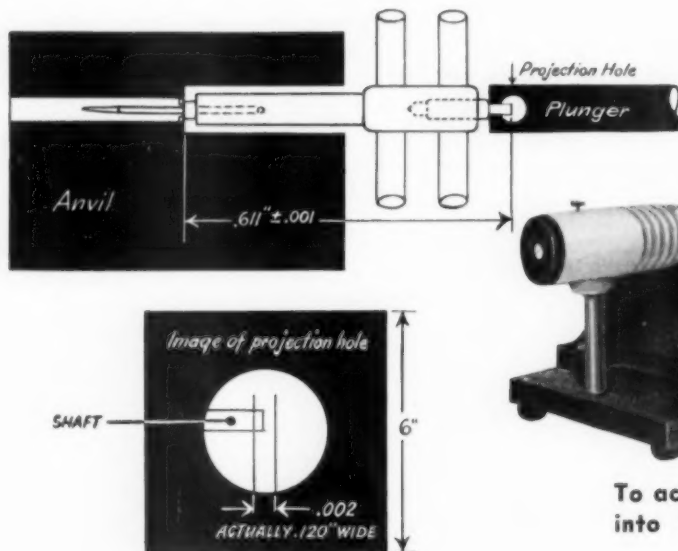
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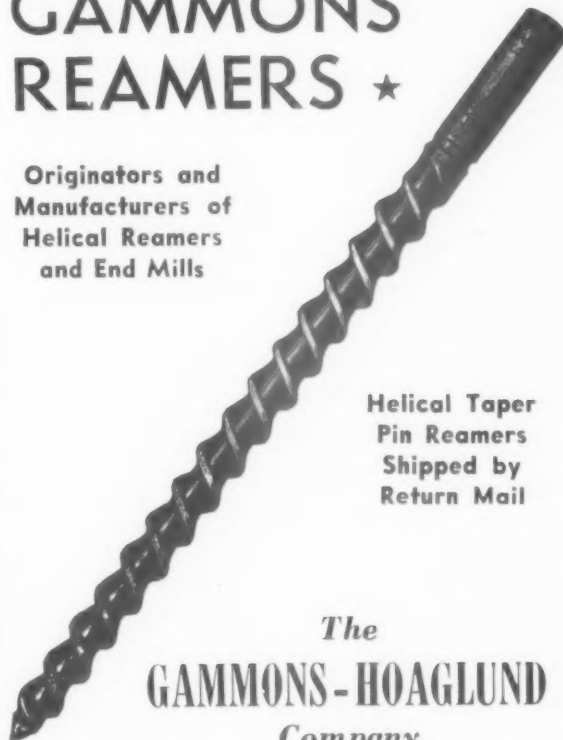
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December, 1952

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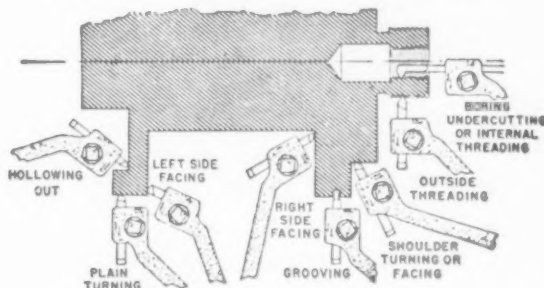


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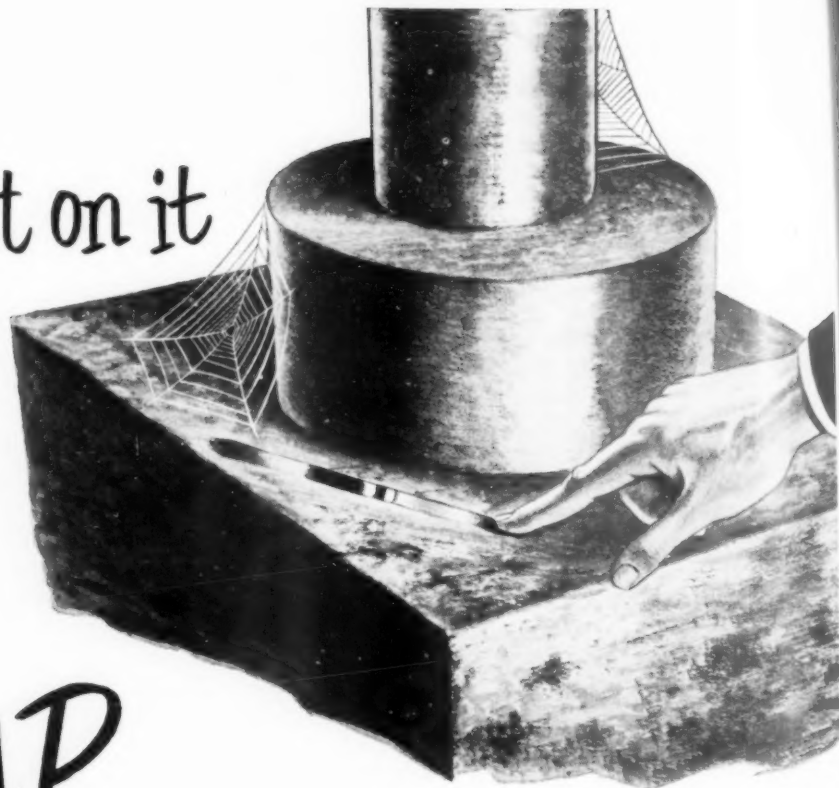
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it's needed to make **STEEL!**

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#### AND WHAT IS SCRAP?

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2. junked autos and old farm machinery.
3. obsolete iron and steel equipment in factories, such as old machinery, tools, dies, jigs, fixtures, chain, valves, etc.

But—the "left-overs" are not great enough today to fill the unprecedented demands for steel production.

And, with replacements scarce, less junked autos and farm machinery have entered the scrap supply lines.

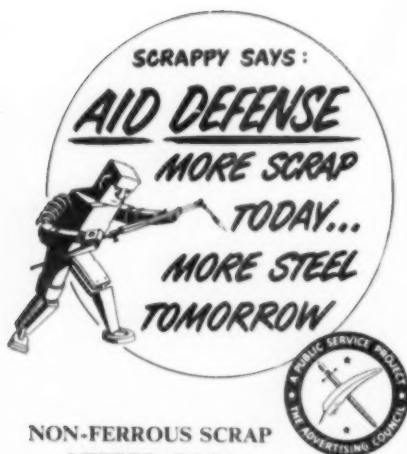
So—only by digging out all the never-to-be-used odds and ends of broken, worn-out, and obsolete factory equipment . . . can mills and foundries get all the scrap they need.

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## **1952**

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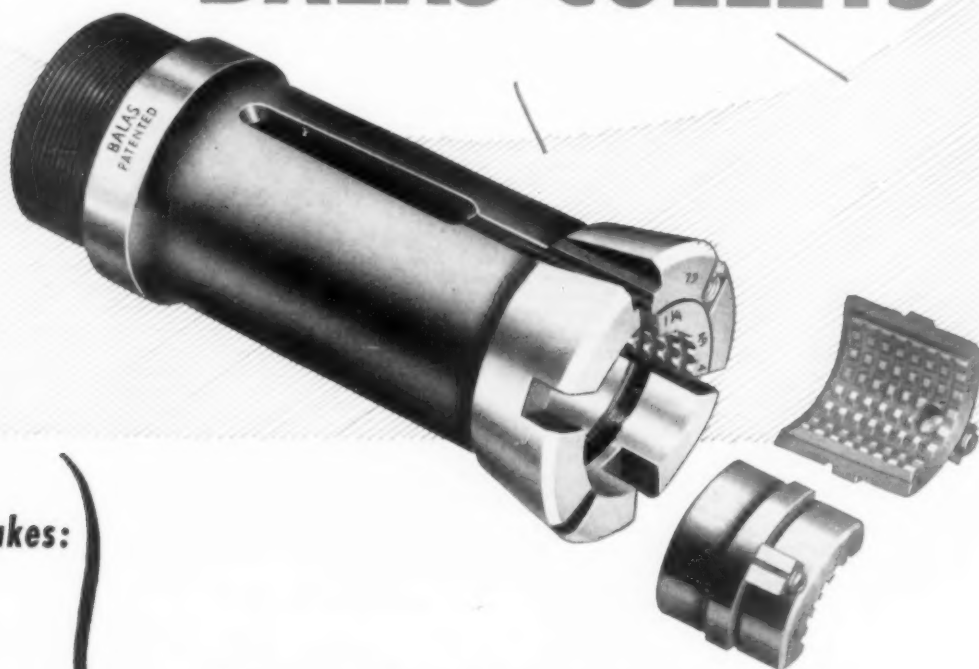
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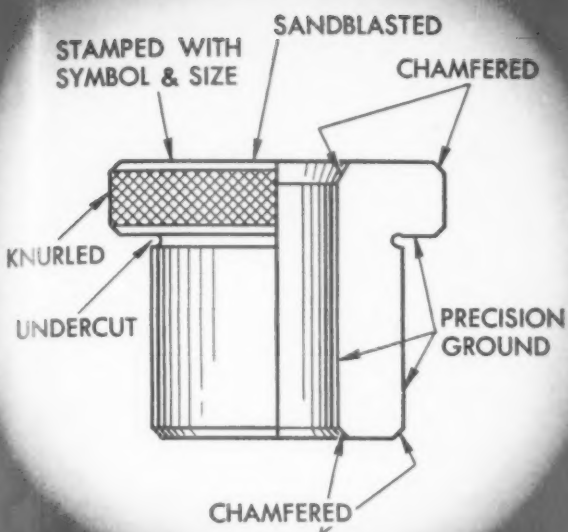
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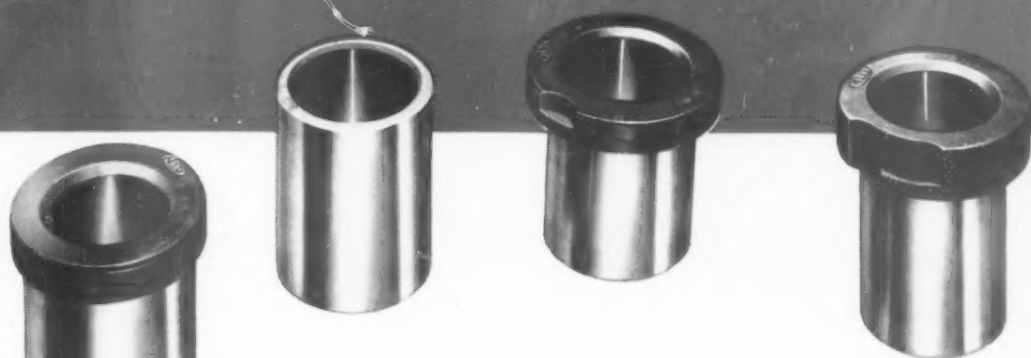
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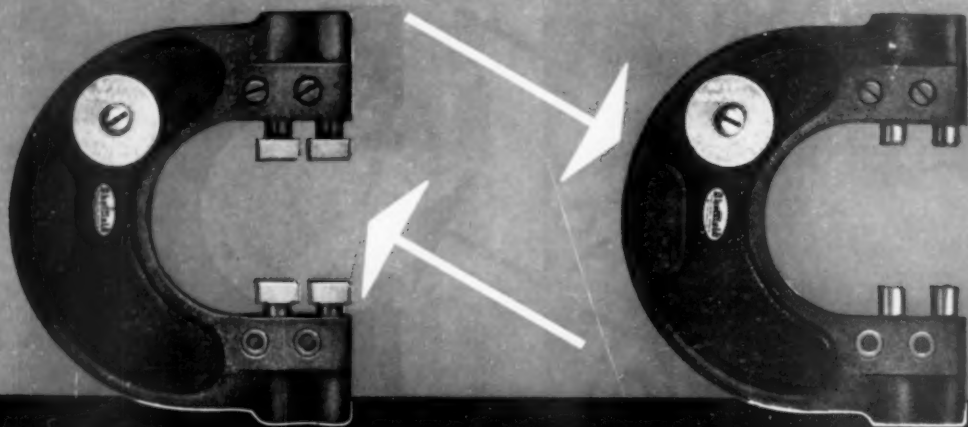
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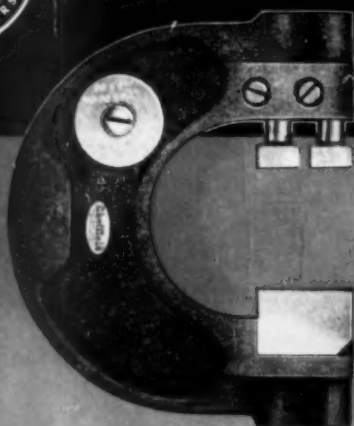
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